Summer 8-1-2011

Differential Reinforcement of Alternative Behavior in Preschool Settings: Evaluation of a Pre-Teaching Component

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DIFFERENTIAL REINFORCEMENT OF ALTERNATIVE BEHAVIOR IN PRESCHOOL SETTINGS: EVALUATION OF A PRE-TEACHING COMPONENT

by

Matthew William LeGray

Abstract of a Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
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August 2011

ABSTRACT

DIFFERENTIAL REINFORCEMENT OF ALTERNATIVE BEHAVIOR IN PRESCHOOL SETTINGS: EVALUATION OF A PRE-TEACHING COMPONENT

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This current study investigated the effectiveness of pre-teaching behavioral expectations prior to the implementation of a differential reinforcement of alternative behavior (DRA) intervention. The ultimate goal of the intervention was to decrease inappropriate behavior while simultaneously increasing appropriate behavior. Intervention that included pre-teaching with DRA was compared to the implementation of DRA in isolation using single case methodology, and intervention data suggest clear differences in beneficial outcomes for each student. The current study offers preliminary data on the utility of pre-teaching behavioral expectations to students prior to intervention. By actually teaching appropriate replacement a behavior prior to intervention, students are provided with a clear idea of how we would like their behavior to change and also gives them the resources to make that change happen. The study utilized the functional behavior assessment (FBA) process as a method to derive function-based data to be used for the development of function based intervention strategies within the differential reinforcement paradigm.

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ACKNOWLEDGMENTS

The writer would like to thank the dissertation director, Dr. Brad Dufrene, and the other committee members, Dr. Heather Sterling-Turner, Dr. Joe Olmi, and Dr. Sterett Mercer, for their advice and support throughout the duration of this project.

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CHAPTER I

INTRODUCTION

Disruptive classroom behaviors are of great concern to teachers and parents. Based on the findings of Rose and Gallup (2004), the lack of ability to manage and motivate student behavior is the number one contributor reported by beginning teachers as a reason for leaving the profession. Student problem behavior can have detrimental effects on the classroom environment by disrupting the normal functioning of the classroom. These disruptive behaviors can impact both the student who is exhibiting these behaviors as well as other students in the classroom. Although there are numerous methods that school personnel use to deal with problem behavior, it is often useful to first determine the behavioral function of the student's inappropriate behavior. Function of behavior is a description of the reinforcement contingency that is in place between a target behavior and a specified variable that is maintaining it. To adequately identify this reinforcement contingency, one must first gather a plethora of information in a systematic fashion. One method for systematically gathering this information is functional behavior assessment (FBA).

A FBA is an approach to assessment in which the hypothesized function of behavior is identified to develop an appropriate intervention strategy that has an *a priori* likelihood of effectiveness. FBA is a systematic method of assessment for obtaining information about the purpose (i.e., function) a problem behavior serves for an individual; assessment results are used to guide the design of an intervention for decreasing the problem behavior and increasing appropriate behavior (Cooper, Heron, & Heward, 2007). The process of an FBA can vary due to the extensive list of protocols and

techniques used to gather functionally relevant information. The literature on FBA suggests that this process is most often conducted using a combination of three methods: (a) indirect methods, (b) direct-descriptive methods, and (c) experimental functional analyses. Indirect methods include the process of reviewing records, interviewing relevant parties, and administering rating scales. Direct-descriptive methods include ABC narrative observations as well as direct observations that include calculating conditional probabilities. Finally, experimental functional analysis procedures include traditional experimental functional analyses as well as brief experimental functional analyses.

Identifying the function of a particular problem behavior will enable the development of a function-based intervention. Function-based interventions are based on the notion that once the function of a problem behavior is known, one can then manipulate the existing behavioral contingencies in a way that will produce a desired behavioral outcome. Manipulations of behavioral contingencies are accomplished by building function-based components into an intervention. Previous literature has shown that function-based intervention strategies increase the likelihood that the intervention will produce a successful outcome (e.g., Ingram, Lewis-Palmer, & Sugai, 2005).

One approach to function-based interventions involves a class of procedures that are commonly referred to as differential reinforcement. Differential reinforcement strategies are used to decrease the occurrence of a targeted problem behavior, and can also include components used to increase the occurrence of appropriate replacement behaviors. Within these strategies, desired changes in the occurrence of a targeted behavior are accomplished by providing a reinforcing stimulus for one response class while withholding reinforcement for another response class. Three common approaches

to differential reinforcement include (a) differential reinforcement of other behavior (DRO), (b) differential reinforcement of incompatible behavior (DRI), and (c) differential reinforcement of alternative behavior (DRA).

DRO consists of delivering a reinforcing stimulus when a particular response is not emitted for a specified interval of time (Reynolds, 1961). As a result, DRO is sometimes referred to as omission training. A number of studies have demonstrated the effectiveness of DRO procedures for reducing the occurrence of maladaptive behavior (Konczak & Johnson, 1983; Mazaleski, Iwata, Vollmer, Zarcone, & Smith, 1993; Repp, Deitz, & Speir, 1974). While some researchers have found success with using DRO in isolation (Konczak et al., 1983; Repp et al., 1974) others researchers have taken a different approach to differential reinforcement by including additional components.

Another technique that is based on differential reinforcement is DRA. In the DRA process, the reinforcer that is maintaining a problem behavior is withheld following the problem behavior and then provided contingent upon the occurrence of a desired alternative behavior (Volmer & Iwata, 1992) that may not be topographically incompatible with the problem behavior. DRA-based interventions attempt to simultaneously reduce a given problem behavior and increase the occurrence of an appropriate replacement behavior. While the use of DRA has been shown to be an effective component in interventions that aim to decrease inappropriate behavior and increase appropriate behavior (Beare, Severson, & Brandt, 2004; Lucas, 2000; Volmer, Roane, Ringdahl, & Marcus, 1999), there are some potential modifications of this procedure that have yet to be fully examined. One example of a potential modification to

a DRA intervention is the use of pre-teaching strategies that may increase the likelihood of the targeted appropriate behavior.

DRI is a subset of DRA that utilizes the concepts of differential reinforcement with the additional component of contingent reinforcement for a behavior that has been selected based on its incompatibility with the problem behavior. Specifically, the replacement behavior is topographically incompatible with the behavior chosen for reduction. The rationale behind the use of DRI is that if occurrence of this incompatible behavior is increased, then the problem behavior will simultaneously decrease. Several studies have demonstrated the effectiveness of DRI procedures for reducing maladaptive behaviors while increasing incompatible replacement behaviors (Firman, 1990; Paisey, Whitney, & Wainczak, 1993; Spira, Koven, & Barry, 2004).

One component that has recently been examined, in combination with differential reinforcement procedures, is the use of pre-teaching behavioral expectations by outlining predetermined and desirable replacement behaviors (LeGray, Dufrene, Sterling-Turner, Olmi, & Bellone, 2010). Preliminary results from LeGray et al. (2010) suggest that clearly specifying and directly teaching the alternative behavior may result in rapid and substantial increases in the occurrence of the alternative response. The process of directly instructing expected behavior to the student may serve as a discriminative stimulus. The idea behind applying this model to behavior is consistent with the current zeitgeist favoring positive behavioral interventions and supports (PBIS).

PBIS is a systematic, universal, proactive method used to prevent behavior problems before they occur, as well as provide adequate early intervention support. PBIS systems may be found in schools, developmental disability centers, and juvenile

detention facilities. PBIS includes the systematic implementation of two broad components: (a) a focus on building prosocial skills to reduce inappropriate behavior and increase appropriate behavior and (b) the development of a continuum of supports that ranges from common universal strategies to individualized strategies (Sugai et al., 2000). Building prosocial skills typically includes clearly communicated expectations (i.e., rules as discriminative stimuli for appropriate behavior) and teaching procedures for directly instructing students to engage in desired behaviors. Additionally, desired behaviors are reinforced in all settings so as to increase their future probability.

Despite the extensive literature base on the efficacy of FBA in contributing to the development of effective intervention strategies, further research is warranted to explore the use of modified function-based intervention strategies and their effect on both inappropriate and appropriate behavior. In the following sections, the history and recent practices of FBA, differential reinforcement, PBIS, and the rationale behind pre-teaching will be reviewed.

CHAPTER II

REVIEW OF THE LITERATURE

History of Functional Behavior Assessment

In 1977, Carr described the potential motivation for self-injurious behavior (SIB) by evaluating five hypothetical behavioral functions through an extensive review of the literature on SIB. The hypotheses represented five possible functions that could be responsible for maintaining SIB and included: (a) positive reinforcement, (b) negative reinforcement, (c) self-stimulation, (d) physiological processes, and (e) establishing ego boundaries or reducing guilt. Carr's review of the literature resulted in the conclusion that SIB could potentially be maintained by three types of contingencies: positive reinforcement, negative reinforcement, and self-stimulation. Carr's focus on functional relationships between behaviors and consequences served as a spring board for further research in this area.

Iwata, Dorsey, Slifer, Bauman, and Richman (1982) experimentally tested Carr's hypothesis by creating an analogue setting in which these functional relationships could be simulated and evaluated. Iwata et al. evaluated three experimental conditions and a control condition in an effort to identify functional relationships between self-injurious behavior and specific environmental variables. The three experimental conditions examined in this analysis consisted of attention (i.e., social disapproval), demand (i.e., escape from an aversive task), and an alone condition (i.e., automatic reinforcement). In the attention condition, the therapist would interact with the participant only after the participant exhibited the target problem behavior. In the demand condition, the therapist would present a task demand to the participant, and the participant would be allowed to

escape from completing the task contingent on the occurrence of the SIB. In the alone condition, the participant was left in an environment in which there were few stimuli present. The alone condition was designed to test for automatic reinforcement as a maintaining variable for SIB. A free play control condition was also used and consisted of the participant having free access to a variety of reinforcers. The frequency of behavior observed during each test condition was compared to the control condition. For six of the nine participants, a single test condition resulted in the highest level of SIB. The findings of the study indicated that SIB could potentially be maintained by a variety of different reinforcement contingencies, and that through experimental manipulation of these contingencies in isolation, it is possible to identify the function of the SIB for an individual.

Since Iwata and his colleagues reported their findings in 1982, there has been a substantial increase in research evaluating various FBA procedures. Since the 1980s, the function of an individual's inappropriate behavior has been seen as an attempt to produce four types of outcomes: (a) to escape, avoid, delay, or reduce aversive stimuli, (b) to gain attention, (c) to access tangible items or activities, or (d) to access automatic reinforcement (e.g., variations in physiological arousal). The FBA process has evolved substantially throughout the years. The literature base on the FBA process has been extended in many different ways to include the investigation of its components used in novel settings, and with various participants, conditions, behaviors, and change agents. Early studies including experimental functional analysis, a specific type of FBA procedure, were conducted in residential facilities with developmentally disabled participants displaying SIB and stereotypy (e.g., Iwata et al., 1982). Today, the literature

on experimental functional analyses has come to include investigations conducted in school settings with typically developing children displaying frequently occurring disruptive behaviors (e.g., Boyajian, Dupal, Handler, Eckert, & McGoey, 2001). The evolution of the FBA process has produced a seemingly endless body of research that will continue to evolve as long as evidence-based procedures are a highly sought commodity within our school systems.

Types of Functional Behavior Assessment Procedures

Since the initial push toward the systematic identification of the potential functions of inappropriate behavior, a number of different methodologies have emerged in the literature. Although there are a multitude of techniques that can be incorporated into the FBA process, each of them can be grouped into one of three categories: (a) indirect methods, (b) direct-descriptive methods, and (c) experimental functional analyses. Indirect assessment methods are removed in time and place from the actual occurrence of the behavior to which they correspond to. Indirect methods can include the use of interviews, rating scales, and/or conducting a review of relevant records. Direct descriptive assessment practices are techniques that attempt to gather information regarding function of a behavior by observing the behavior and corresponding environmental events in real time. Direct descriptive techniques include a number of different methods used to directly observe behavior such as ABC narratives and interval observations with conditional probability assessments. Direct descriptive procedures produce correlational data only. Experimental analyses involve manipulating environmental variables to occasion the target behavior and isolate the contingency of reinforcement responsible for the behavior.

Indirect Methods

Within the FBA process there are indirect approaches for gather functional information. Reviewing academic records can provide an indication of the student's academic ability. It is often the case that students who are displaying inappropriate classroom behavior are doing so because they are motivated to escape difficult academic tasks. Additionally, office discipline referrals may be used to gather information related to antecedents and consequences for target behaviors. Subsequently, hypotheses can be made regarding triggers for the behavior and possible reinforcing contingencies. Unfortunately, school records are rarely coded in a systematic fashion so the reliability of archival data is often questionable.

In addition to school records, rating scales and questionnaires may be used as indirect assessment procedures. In fact, there are several rating scales and questionnaires that have been described in the FBA literature. The Functional Assessment Interview (FAI; O'Neil et al., 1997) aims to identify information about specific problem behaviors that include, events associated with their occurrence, antecedent and consequent variables, problem severity, and information about desired behavioral alternatives. The Functional Assessment Informant Record for Teachers (FAIR-T; Edwards, 2002; Doggett et al., 2001) was developed to be used as a checklist or semi-structured interview that aims to gather information regarding target problem behaviors and antecedents and consequences for those behaviors. Research has shown that information gathered with the FAIR-T corresponds with experimental analyses and is useful for treatment planning (Doggett et al., 2001). The Motivation Assessment Scale (MAS; Durand & Crimmins, 1992) aims to determine specific environmental events associated with self-injurious

behavior exhibited by individuals with developmental disabilities. Previous research has indicated that the MAS is psychometrically sound and produces results that are consistent with other functional assessment procedures (Shogren & Rojahn, 2003). Finally, the Questions About Behavioral Function (QABF; Matson & Vollmer, 1995) behavior checklist is used to assess variables that may potentially be maintaining the disruptive behavior of individuals with severe disabilities. Previous research evaluating the QABF indicates it is a reliable instrument that corresponds, at least moderately, with other functional assessment procedures (Paclawskyj, Matson, Rush, Smalls, & Vollmer, 2001).

Direct Methods

Direct observations of a student's inappropriate behavior in the classroom setting can be a valuable tool within the FBA process. By viewing the behavior as it actually occurs, and systematically charting the frequency of occurrence, baseline data can then be gathered. Additionally, data can be gathered regarding the occurrence of temporally proximal antecedent and consequent events. One common method for analyzing direct-observation data is through the use of conditional probabilities. In a conditional probability assessment, occurrences of a behavior are recorded along with any antecedent or consequent events that occur within close temporal proximity (VanDerHayden, Witt, & Gatti, 2001). Then, observational data are analyzed such that a probability coefficient for any environmental event can be calculated and used to estimate the frequency with which a behavior is preceded by some antecedent or followed by some consequence. Conditional probability data may be used to make hypotheses regarding functional relationships between target behaviors and antecedents that may occasion the behavior and consequences that may maintain the occurrence of the behavior. The literature on

FBA has shown that various combinations of these direct methods have produced valuable information that has led to successful, function-based intervention strategies.

Carter and Horner (2007) outlined a case study in which direct methods of gathering assessment data were used while conducting an FBA as an added component of a manualized early intervention program know as First Step. The participant in the study was a 6-year-old Caucasian student who was referred for behavior support by his teacher. The dependent measures in the study were talk-outs, out-of-seat, noncompliance, and aggression. The independent variable manipulated in the study was the addition of function-based support to the standard First Step program. An FBA was conducted for the participant using a teacher interview and direct observations. The direct observations were conducted using the Functional Assessment Observation Form (FAOF; March et al., 2000). The FAOF was used to provide information on the occurrence of the target behaviors as well as provide information regarding behavioral function. The assessment data that were gathered indicated that problematic behavior was more likely to occur in unstructured environments and was likely to be followed by peer attention. Based on the assessment information, function-based components were developed for inclusion into the First Step program. These components included: (a) additional daily communication with the family to address events that may have occurred at home, (b) explaining to the student the behavioral expectations relevant to a subsequent activity, (c) one-to-one instruction for the students' appropriate behavior, (d) providing reinforcement for appropriate behavior, and (e) incentives for ignoring distractions in the classroom. The results of implementing these function-based components in addition to the First Step program indicated a decrease in the targeted inappropriate behavior as well as an increase

in academic task engagement. Results of the study show how direct assessment methods can be used to gather information on behavioral function which can then be used to create function-based components that can contribute to successful intervention.

The utility of direct methods of gathering assessment data is illustrated in a study by VanDerHeyden et al. (2001). The study evaluated descriptive assessments that were conducted in the natural setting to identify naturally occurring, high-frequency events that could serve as maintaining consequences for the disruptive behavior exhibited by the students in two different classrooms. This study is unique in that FBAs were conducted while using the entire class as the unit of analysis. The students in the first classroom were between the ages of 2 and 4 and attended a daycare for children with speech and language delays. The students in the second classroom were all 4 years of age, and enrolled in Head Start. Following a teacher interview conducted by one of the experimenters, operational definitions were developed for target behaviors in each classroom. These definitions included two target child behaviors, one peer behavior, and between five and eight teacher behaviors in each classroom. A 10-s partial interval recording procedure was used during a whole-class observation session in which the observation was systematically rotated among all the children of the classroom and each occurrence of each behavior was tracked. Following the observations, conditional probabilities were then calculated. Through the use of a whole-class descriptive assessment that included conducting conditional probability assessments, the data indicated attention was the primary maintaining variable for disruptive behavior for both classrooms. The experimenters then implemented a DRA intervention that withheld attention following disruptive behavior and provided attention contingent upon

appropriate behavior (e.g., attending to instruction). The intervention reduced each class' overall level of disruptive behavior.

Experimental Functional Analyses

An experimental functional analysis is an analysis in which consequent variables believed to be in the individual's natural environment are arranged within an experimental design so that their separate effects on the specified problem behavior can be observed and measured (Cooper et al., 2007). In a functional analysis, multiple experimental conditions are used to examine the effects of specific types of possible reinforcement contingencies on the problem behavior in order to identify which contingency of reinforcement is most likely maintaining that problem behavior in the natural environment. In a functional analysis condition, a specific contingency of reinforcement is operationally defined and that contingency is only delivered following the occurrence of the targeted problem behavior, while all other types of reinforcers are withheld. By tracking the occurrence of the targeted problem behavior through multiple contingencies of reinforcement (conditions), an experimenter can identify which reinforcement contingency is responsible for the highest frequency of the targeted behavior. The contingency of reinforcement that is associated with the highest level or rate of the problem behavior is most likely functioning as the primary maintaining variable for that behavior in the student's natural environment. Once the variable maintaining the problem behavior is identified, appropriate treatment plans can be developed to extinguish the problem behavior. Conditions that are selected to be included in experimental functional analyses can vary from study to study.

Within the literature on experimental functional analyses, the most commonly used conditions are free play (i.e., control condition), demand, attention, and tangible reinforcement. The free play condition is usually used as an experimental control condition in which the individual has free access to a variety of reinforcers in the absence of task demands. Demand (or escape) conditions involve allowing the individual escape (disengagement) from a task demand contingent upon the occurrence of the problem behavior. Attention conditions involve withholding any form of attention from the student and then providing attention contingent on the occurrence of the problem behavior. Tangible reinforcement conditions involve providing the individual with a specific tangible reinforcer upon the occurrence of the problem behavior.

Early investigations using experimental functional analyses have commonly been conducted in clinical facilities that utilized highly controlled environments to identify behavioral function. An example of experimental functional analyses in clinical settings can be seen by looking at an investigation conducted in by Northup and colleagues (1991). In their study, the authors conducted a brief functional analysis of aggressive and alternative behavior in an outpatient clinic setting. Three participants were used in the study and included a 24-year-old male with profound mental retardation, a 21-year-old female with severe to profound mental retardation and a 13-year-old female with moderate mental retardation. Each of the participants had been referred for clinic services for aggressive behavior. The focus of the study was to investigate the use of a brief analogue analysis procedure followed by a contingency reversal. Brief functional analyses differ from traditional experimental analyses in some important ways. First, brief experimental analyses include only one datum per condition, whereas traditional

analyses include many sessions per experimental condition. Also, brief analyses typically include a brief multi-element design with a contingency reversal phase, and traditional analyses typically include a traditional multi-element design.

In Northup and colleagues (1991) study, the experimenters recorded three classes of behavior that included aggressive behavior, appropriate behavior, and manding behavior (i.e., appropriate request). Each aggressive behavior was defined individually for each of the participants. Appropriate behaviors were defined as being on task. Manding behavior was defined as any recognizable verbalization, manual sign, or recognizable gesture that served as a request. The analogue assessment conditions identified escaping from task demands as the function of problematic behavior for two of the three participants and access to attention for the final participant. For all three participants, relatively low levels of manding were observed during the analogue assessment. The experimenters then reversed each of these contingencies so that the identified form of reinforcement from the analogue assessment was withheld when the targeted problem behaviors occurred. The results of the contingency reversal phase showed a decrease in the level of problem behavior for all three participants. The contingency reversal was also successful in increasing manding behavior for all three participants. The results of this study show how the use of a clinic-based experimental analysis of problem behavior can accurately identify the function of problem behavior, and how that identified function can be used in a reversal condition to decrease problem behavior as well as increase appropriate behavior.

Another example of an experimental functional analysis implemented in an analogue setting is an investigation conducted by Meyer (1999). The study focused on the

use of a functional analysis and a follow-up treatment for problem behavior exhibited by elementary school children. In this study, four participants who were earlier assessed to be functioning in the borderline to average range of intellectual ability (IQ range 75 to 98). The participants included two first grade and two third grade students.

The initial functional analysis was conducted within a room located within a school for children with learning disabilities and emotional handicaps. The dependent measure of the study was the percent of intervals with off-task behavior and was assessed through the use of a 20-s momentary time sampling procedure. The functional analysis consisted of four conditions that combined different levels of experimenter attention and task difficulty. The conditions were identified as: (a) Easy Task/High Attention, (b) Easy Task/Low Attention, (c) Difficult Task/High Attention, and (d) Difficult Task/Low Attention. Easy and difficult tasks were determined through experimenter collaboration with the teacher. The high attention component was described as the experimenter providing attention every 30 seconds, while the low attention condition was described as the experimenter providing attention every 3 to 4 minutes. The results of the functional analysis for three of the five students suggested a high level of difficulty in task demands was associated with their highest levels of off task behavior. For another student, the results of the functional analysis suggested that low levels of attention were associated with her highest levels of off task behavior. Following the analysis, two treatment phases were implemented that involved providing either reinforcement of a student response aimed at seeking attention (“Am I doing good work?”) or a student response that was aimed at seeking help (“I need some help”). In these two treatment conditions, the experimenter’s response would correspond to the student’s request, and data were

collected on off-task behavior. After implementation of these two interventions with each student, the results showed a decrease in off task behavior for the three students whose behavior was previously associated with difficult tasks. A decrease in off task behavior was also observed for student whose behavior was associated with low levels of attention. The results of this study provide an example of how experimental manipulation of combined antecedents and consequences can aid in the identification of behavioral function under particular antecedent conditions, and link to successful treatment plans.

Although analogue or clinic-based experimental functional analyses have an extensive research base, there are also a growing number of studies in the literature that have examined this methodology within natural environments. While analogue, or clinic-based settings provide a more restrictive environment that favors experimental control and manipulation, it is not necessarily a true representation of the environment in which an individual's problem behavior occurs. An example of the true environment in which an individual's problem behavior occurs might be a referred student's classroom. Researched aimed at investigating the use of functional analyses in natural settings is growing within the literature.

In 2001, Boyajian and colleagues used a classroom-based brief functional analysis with preschoolers that were at-risk for Attention Deficit Hyperactivity Disorder (ADHD). In their study, the authors used a brief functional analysis within a classroom setting to identify the variable most associated with the target problem behavior. Three pre-school aged children, who all were at-risk for ADHD, participated in the study. Age range for the children was 4 years, 11 months to 5 years, 1 month. The primary dependent measures used in the study were aggression and noncompliance. The brief classroom-

based experimental functional analysis consisted of play (i.e., control), attention, tangible, and demand conditions. All of the conditions were conducted by experimenters within the participants' classroom. Following the initial analogue assessment, a replication phase was conducted in which the conditions that produced the lowest and highest rate of the target behavior were implemented again. Once a replication phase was conducted for each participant, a contingency reversal was then implemented. In the contingency reversal phase, the consequence that was related to the highest level of inappropriate behavior during the analogue assessment was then provided only when the participant made an appropriate response (i.e., a request). The results showed a clear difference of each participant's level of inappropriate behavior between the different conditions, indicating an identified function of the behavior. The results also indicated that after these contingencies of reinforcement were reversed, a decrease in inappropriate behavior was observed. The current study provides an example of how a classroom-based experimental functional analysis can be a useful tool in determining the function of an inappropriate behavior and can lead to a successful reversal of these contingencies of reinforcement.

Another example of the potential utility of classroom-based functional analysis can be seen when examining the work of Dufrene, Doggett, Hennington, and Watson (2007). Dufrene et al. (2007) conducted FBAs, that included a classroom-based abbreviated functional analysis, for three 5-year-old preschool children. During the abbreviated functional analysis the experimenters included tangible, attention, and escape conditions for all three participants. In combination with information obtained during interviews and direct-descriptive assessments, the results from the abbreviated functional analysis showed convergence for all three children. Results from this study provided

preliminary support for the use of multicomponent FBAs in preschool classrooms for developing individualized interventions.

LeGray et al. (2010) further investigated the use of classroom-based brief functional analyses in a preschool setting. Participants in this study included three African American males that had all been referred for services due to frequent and disruptive inappropriate vocalizations. During the initial FBA for each participant, experimenters conducted a brief functional analysis of inappropriate vocalizations that included tangible, escape, attention, and free play conditions. To demonstrate experimental control of the brief functional analysis, a contingency reversal phase was implemented for each participant. Results from the brief functional analyses showed clear separation of the maintaining variable for each participant. Experimental control was further demonstrated during contingency reversal phases. FBA data were used to develop effective function-based interventions for each student. LeGray and colleagues' study extends the literature on classroom-based brief functional analysis by providing an additional example of FBA with typically developing preschool students.

Experimental functional analyses have developed a great deal throughout history. There have been multiple research studies in this area that have included novel conditions. While early research in the area of experimental functional analyses dealt mainly with the traditional conditions (i.e., tangible, free-play, attention, and escape), the evolution and development of the literature base on experimental functional analysis has grown to include unique conditions specific to the presenting problem behaviors.

An example of the versatility of experimental functional analyses can be found by looking at an experiment conducted by Kelley, Shillingsburg, Castro, Addison, LaRue,

and Martins (2007). The authors set out to investigate the use of the experimental analysis methodology with verbal behavior. The authors aimed to accomplish this by manipulating four different verbal operants and measuring the percentage of trials that resulted in engagement in the target verbal behavior for each participant. The participants were four boys who had been diagnosed with developmental disabilities. A minimum of two target verbal behaviors were operationally defined for each participant. Each target verbal behavior represented an item or object that, for the purposes of the different conditions, could be manipulated. The four conditions manipulated in the study were echoic, mand, tact, and intraverbal. The echoic condition consisted of the experimenter vocally prompting the participant by saying the target word and providing reinforcement contingent on the participant vocalizing the target word. The mand condition was set up so that the experimenter would restrict access to the item prior to the session and produce the item during the condition contingently upon the target vocalization provided by the participant. The tact condition consisted of the experimenter pointing to the item, asking the participant what it is, and then providing reinforcement contingent upon the verbalization of the target word. The intraverbal condition consisted of the experimenter providing a verbal prompt that included a phrase designed to occasion the targeted verbal response from the participant. If the participant vocalized the target word, reinforcement was then provided. The results of the study show a distinct difference between conditions for each participant. In every case, one condition produced the highest percentage of trials in which the participant engaged in their target vocalization. The results suggested that the experimental analyses of verbal operants can be very useful in determining the function of verbal behavior. The study provides an example of how the methodology of

experimental functional analyses can be applied in unique ways to determine behavioral function.

Another unique manipulation of functional analysis methodology was examined by Mueller, Sterling-Turner, and Moore (2005). The authors investigated the use of a classroom-based functional analysis procedure to assess escape-to-attention as a variable maintaining problem behavior. The authors aimed to assess the combination of multiple variables compared to when each variable was used in isolation. The single participant in the study was a 6-year-old student with autism attending general and special education classes. According to the teacher, problem behavior most often occurred during handwriting tasks. The dependent measure was the percentage of intervals containing tantrum behavior. Hypotheses about the possible variables which had been maintaining the student's disruptive behavior were derived from record review, teacher and paraprofessional interviews, and direct observation. A hypothesis based functional analysis was then conducted which involved the use of escape attention condition, control conditions. These conditions were implemented in accordance to procedures described by Iwata et al. (1982). After the initial functional analysis and reviewing the data, the authors conducted a follow-up analysis. The follow-up analysis consisted of control escape condition, and escape-to-attention conditions. The escape condition in the follow-up analysis was identical to the escape condition in the initial analysis. The control condition for the follow-up analysis was nearly the same as in the initial analysis, but this time the student was required to be seated at his desk. The escape-to-attention condition in the follow-up analysis was similar to the escape only condition with the added component of attention being delivered to the student from the paraprofessional during

the 20-s escape period. All of the analyses took place within a classroom setting and occurrence or nonoccurrence of the target behavior was recorded by a behavioral consultant. Each condition lasted 5 min and involved a 10-s partial interval recording procedure.

Results showed that during the initial functional analysis the student's tantrum behaviors only occurred during the escape condition. The follow-up functional analysis showed tantrum behavior occurred during the escape condition ($\underline{M}$ = 6.67), but also showed a much higher level during the escape-to-attention condition ($\underline{M}$ = 44.67). The results of the study suggest that, in some cases, it may be beneficial to investigate a combination of variables within functional analysis conditions. This study also shows that the traditional methodology used in functional analyses could potentially be expanded to included novel components that promote the evolution of experimental functional analyses.

While the methodology used in conducting an FBA is continuously evolving, the goal of an FBA remains the same. The collection of data relevant to behavioral function is, and will always be, the primary objective of an FBA. Historically, FBA data have been used to develop interventions that are based on principles of differential reinforcement. For example, FBA data are used to develop interventions that limit access to reinforcer following problem behavior while increasing access to reinforcers for non-occurrence of problem behaviors or the exhibition of some alternative response.

Differential Reinforcement of Other Behavior

DRO is a procedure for decreasing problem behavior in which reinforcement is contingent on the absence of the problem behavior during or at specific times (Cooper et

al., 2007). Reynolds (1961) first introduced this methodology into the literature by conducting an experiment investigating key pecking behavior of pigeons. The first application of DRO with human participants was introduced in the literature by Allen and Harris (1966). In their study, Allen and Harris successfully reduced the harmful scratching behavior of a 5-year-old girl. The experimenters trained the child's mother on a strategy that aimed to extinguish reinforcement that had previously been provided contingent upon the child's scratching behavior. Additionally, behaviors that would occur in the absence of the scratching behavior were reinforced. The intervention was not only initially effective, but follow-up analysis indicated that the scratching behavior had not reoccurred at 4 months post intervention. This intervention methodology is a very common approach to dealing with inappropriate behaviors across a wide variety of behaviors and settings.

DRO interventions consist of two components: (a) an extinction component, and (b) a reinforcement component. The extinction component of DRO involves withholding a specified form of reinforcement that, in the past, has been contingent on the occurrence of a certain behavior. The reinforcement component of DRO involves providing reinforcement contingent upon the absence of the targeted behavior. Research has shown that when these two components are used together they are more effective than when each component is used in isolation. Lennox, Miltenberger, Raymond, and Spengler (1988) reviewed the literature base on treatment strategies that have been used to decrease problems behaviors. Through their meta-analysis, these researchers indicated that differential reinforcement procedures were frequently used in the literature.

Mazaleski et al. (1993) examined the reinforcement and extinction components of DRO while treating the (SIB) of three women with developmental disabilities. In this study, social attention was identified as the maintaining variable for SIB. The experimenter implemented one intervention that isolated DRO with the extinction component and one in which the extinction component was not included. Results indicated that the combination of DRO with an extinction component was responsible for the greatest decrease in SIB. The study did not include the investigation of adaptive replacement behaviors that the participants engaged in when they were not exhibiting SIB.

DRO-based interventions have traditionally been used when dealing with SIB displayed by individuals with various types of disabilities, and have been shown to be effective. Cowdery, Iwata, and Pace (1990) conducted a study that evaluated the effects of DRO that utilized a token economy as the form of reinforcement to combat severe scratching behavior exhibited by a 9-year-old boy. The experimenters identified the maintaining contingency of reinforcement as automatic reinforcement. The intervention used in the study consisted of the experimenters providing the participant with a penny contingent upon the child not engaging in the scratching behavior during an interval of 30 minutes. Results indicated that the intervention was successful due to that fact that the percentage of intervals in which scratching behavior was observed had decreased to zero from the 78% observed in baseline. However, the study did not report any information about adaptive replacement behaviors. The study suggested that the use of DRO, when using token reinforcers, can decrease SIB, but less is known regarding the extent to which SIB was replaced by a socially valid replacement behavior or response class.

Although shown to be effective in decreasing inappropriate behavior, DRO has also been shown to be ineffective when compared to other procedures (Corte, Wolf, & Locke, 1971; Foxx & Azrin, 1973). In 1973, Foxx and Azrin conducted a study that investigated the use of an overcorrection procedure aimed to eliminate the self-stimulatory behavior of two children with autism. A second goal of the study was to also make within-subjects comparisons of four other procedures that were also implemented. The self-stimulatory behavior of interest was hand mouthing, and was recorded as occurrence per hour. The four other procedures consisted of a DRO procedure, a punishment procedure, and a distasteful solution procedure. The overcorrection procedure consisted of the experimenter telling the child "no" and brushing her teeth with a toothbrush contingent upon hand mouthing behavior. The DRO procedure consisted of the experimenter providing reinforcement whenever a 10-second interval had elapsed in which the participant did not engage in hand mouthing. The punishment procedure consisted of the experimenter slapping the participant on the leg when they engaged in hand mouthing. The experimenters also included a noncontingent reinforcement condition in which they provide reinforcement at irregular intervals averaging one minute. The experimenters used the noncontingent procedure between each of the other procedures in hope of minimizing carry over effects. The results of the study showed that both participants engaged in zero hand mouthing behaviors when the overcorrection procedure was used. The study also showed that the procedure that corresponded to the highest levels of hand mouthing behavior was the DRO procedure. The authors did not record any data on appropriate or replacement behaviors. According to the results of the study, DRO was not a useful procedure when compared to other procedures. The study is

an example of how DRO may not be an effective intervention for all response topographies and functional categories. In an effort to improve the effectiveness of differential reinforcement, researchers have developed a variety of differential reinforcement procedures in addition to DRO.

Differential Reinforcement of Alternative Behavior

DRA is a procedure for decreasing problem behavior in which reinforcement is delivered for a desirable alternative to the behavior targeted for reduction and withheld following instances of the problem behavior (Cooper et al., 2007). The use of DRA has gained popularity due to the fact that it not only aims to extinguish the targeted inappropriate behavior, but it also promotes the development of a replacement behavior. The DRA intervention methodology is gaining popularity within school systems because it is a positive procedure that not only reduces inappropriate behavior, but it teaches students what they can do instead.

One example of an investigation utilizing the methodology behind DRA can be seen when examining Konarski and Johnson (1989). Konarski and Johnson reported a study in which they used brief contingent restraint for SIB, while using praise to reinforce alternative behaviors. The participants in the study consisted of a 31-year-old female and a 19-year-old male. Both participants were multiply handicapped and functioned at the profound level of mental retardation. The participants had both recently been moved to a nursing home and were engaging in severe tantrums throughout the day and also threw objects. The researchers developed a DRA-based intervention that included brief restraint contingent on noncompliance and praise for compliance with specific demands. The results indicated that DRA intervention was successful in decreasing SIB and object

throwing, and increased compliance with demands. This early investigation of the DRA methodology provides an example of how placing an SIB on extinction and providing contingent reinforcement for an alternative response can produce successful outcomes for individuals who exhibit destructive behaviors.

Richman, Wacker, Asmus, and Casey (1998) investigated two different problem behaviors exhibited by the same individual. The two problem behaviors were described as disruptive behaviors (i.e., pushing, throwing objects, screaming) and finger picking (i.e., skin picking). A functional analysis indicated that both behaviors were maintained by different reinforcement contingencies. Disruptive behaviors were maintained by escape from demands and finger picker behaviors appeared to be automatically reinforced. The researchers attempted to reduce these behaviors by preventing escape and blocking finger picking. At the same time, they introduced mand training, which was used to promote the appropriate replacement behavior of requesting reinforcement. The results indicated that escape extinction in combination with DRA produced low levels of the disruptive behaviors as well as the highest levels of independent manding (i.e., requesting) observed in the study. The results for finger picking showed a similar pattern in that the lowest levels were witnessed during the sensory extinction plus DRA condition, but no data were reported on independent manding A three month follow-up was also conducted and indicated low rates of each problem behavior and some instances of independent manding The investigation conducted by Richman et al. demonstrated the effectiveness of a DRA-based intervention strategy for reducing multiple problem behaviors while simultaneously increasing an appropriate replacement behavior

Lucas (2000) examined the effects of Time-Out (TO) and DRA on the aggressive behavior of a two-year-old boy exhibiting physical aggression in the form of hitting. The researcher first examined the use of TO in isolation and then examined the use of TO in combination with DRA. The TO procedure consisted of the experimenter placing the participant away from reinforcement for a period of 3 minutes. The DRA protocol consisted of TO in combination with verbal praise contingent upon cooperative play. The results of the study indicated lower occurrences of hitting behavior after implementation of the combined DRA and TO intervention. The study illustrated how DRA interventions can be used in combination with additional components and can produce successful results that indicate a decrease in problem behavior and an increase in appropriate behavior. While multiple components in DRA interventions have been investigated, further investigation is warranted. For example, research may evaluate the extent to which pre-teaching exercises impact the success of a DRA-based procedure.

In order to create these modified DRA intervention packages, one must first decide what components to include in addition to DRA. An experimenter can arrive at these decisions by looking at two issues. The first issue that must be taken into consideration is what the overall theme of the intervention package will be. The DRA component of the intervention will inherently steer this theme toward the encouragement of appropriate positive behavior in place of inappropriate negative behavior. The second issue that must be taken into account is how that positive behavior will be instructed and maintained.

LeGray et al. (2010) investigated the effectiveness of a modified DRA intervention for disruptive behavior of three preschool students. Through the use of an

alternating treatments design (ATD), LeGray compared three conditions and their subsequent effects on inappropriate and appropriate vocalizations. The three conditions that were compared included Pre-Teaching combined with DRA (PT+DRA), DRO, and control (i.e., no intervention). The aim of the investigation was to determine if programming for adaptive replacement behaviors would show results that exceeded what was observed when using DRO in isolation. In effort to assess each participant's specific display of inappropriate vocalization, an FBA was conducted. FBAs included teacher interviews and brief functional analyses. The information gathered during the FBA process was then used to develop function-based interventions for each student. PT+DRA consisted of two teacher implemented components. Prior to the start of the DRA session within classroom the teacher took the student to a quiet corner of the room and provided pre-teaching for a desirable replacement behavior. Following pre-teaching, the teacher then returned to the group with the student and the DRA component of the session began. DRA included providing the reinforcer identified during the FBA for the occurrence of a desirable replacement behavior.

DRO consisted of the teachers ignoring any instance of inappropriate vocalizations and also ignoring the occurrence of any other problem behaviors. Conversely, the teacher provided the identified form of reinforcement contingent upon a 30-second absence of inappropriate vocalizations. The teacher's responses were cued by the primary experimenter through the use of a colored note card. A green card was used to signal the initiation of the identified form of reinforcement.

The control condition consisted of the classroom teacher engaging in her typical instructional methods. During control condition sessions, the teacher was instructed to

provide academic instruction in the manner that routinely used. Additionally, the teacher was instructed to manage behavior in the manner that she routinely used.

Results from LeGray et al. (2010) indicated that, for all three participants, the PT+DRA condition was the most effective method for reducing inappropriate vocalizations while simultaneously increasing appropriate vocalizations. More specifically, while the DRO condition contributed to lower levels of inappropriate vocalizations, the behavior change was not as substantial as what was witnessed during the PT+DRA conditions. Furthermore, the PT+DRA conditions produced the highest amount of appropriate vocalizations.

Implications from LeGray et al. (2010) provide preliminary indication of the effectiveness of DRA procedures on disruptive behavior within preschool settings. The results suggest that DRA can decrease inappropriate behavior while simultaneously increasing appropriate behavior. Although these results are promising, the PT+DRA condition used in LeGray et al. (2010) possessed two components. It is not clear whether the addition of the pre-teaching component was essential for the effectiveness of the DRA procedure. Future research might include a component analysis of the PT+DRA intervention package.

Positive Behavior Interventions and Supports

PBIS includes application of positive behavioral interventions and supports to achieve socially important behavior change (Sugai et al., 2000). PBIS is based on a systems approach to providing adequate behavioral interventions as well as sound support networks. In effort to accomplish this, a PBIS effort emphasizes proactive instruction of desired behavioral expectations, frequent reinforcement of appropriate

behaviors, and consistent monitoring and feedback related to problem behavior. In addition, PBIS promotes data-based decision making and the application of more intensive and individualized intervention for students who are not responding to prevention efforts. (Lewis & Sugai, 1999; Sugai & Horner, 2002)

Although many different components have been successfully used in the implementation of system-wide PBIS, Sugai and Horner (2002) identified five key features that are necessary for proper implementation: (a) a prevention focused continuum of support, (b) proactive instructional perspective, (c) conceptually and empirically sound practices, (d) data-based decision making, and (e) a systems perspective. According to Sugai and Horner, these five elements are essential in the implementation of system-wide PBIS. Sugai et al. (2002) further describe proactive instructional approaches as including instructional practices, systems and processes that: (a) maximize educational outcomes, (b) select and teach school-wide and classroom-wide expectations, rules, and routines, and (c) practice and reinforcement of the use of appropriate behavior skills across multiple settings and contexts. These three components outline how instruction can be developed in a way that will give students a greater chance of being successful academically and socially. One of the key components of PBIS is pre-teaching appropriate social behaviors on a regular basis. Pre-teaching appropriate behaviors prior increases the likelihood that students possess the skill necessary for behaving appropriately, and also makes the reinforcement contingencies for appropriate behavior more salient.

The rationale behind pre-teaching behavioral expectations can best be described through the concept of antecedent stimulus control. The manipulation of various

antecedents has been repeatedly shown to be effective in experimental operant research. Stimulus control is reached through the reinforcement of a desired behavior, when that behavior has occurred in the presence of a discriminative stimulus. In contrast, the behavior is not reinforced in the absence of that same discriminative stimulus (Reynolds, 1975) or in the presence of an S-Delta. Therefore, we can confidently say that a particular behavior would be likely to occur in the presence of a particular stimulus and less likely to occur in the absence of that stimulus. The concept of stimulus control lends well to the pre-teaching component commonly used in PBIS. By pre-teaching behavioral expectations to students, the student is provided with discriminative stimuli that signal the availability of reinforcement contingent upon the performance of the expected behavior. Pre-teaching appears well suited for individuals who may be lacking in requisite skills needed to contact reinforcement in the natural environment. Young children and those with developmental disabilities would likely benefit from such an approach as their skill repertoire may be limited. Therefore, researchers may investigate the impact of pre-teaching procedures used in conjunction with DRA procedures.

Purpose

In the seminal article by Baer, Wolf, and Risely (1968) the seven dimensions of applied behavior analysis are described. Baer and colleagues indicate that *Effective* is the one of the essential seven dimensions of applied behavior analysis. The authors state that in order for a behavioral technique to be considered effective, it needs to produce a large enough effect for practical value. According to the authors, if this effect is not large enough for practical value, then the intervention has failed. Additionally, it can be argued that applied practices are those that not only reduce problem behaviors, but increase the

future occurrence of replacement behaviors that allow an individual to be more successful in their environment. DRA is a prime example of an intervention strategy that accomplishes this. DRA interventions can simultaneously reduce problem behavior and increase a specific alternative behavior. Teachers and school personnel are routinely looking for interventions strategies to use when dealing with students' inappropriate behavior. DRA methods include the use of extinction strategies, while reinforcing the use of functionally equivalent responses of a more desirable form. The desirable behavior will then contact the same form of reinforcement that was maintaining the problem behavior. LeGray et al. (2010) demonstrated the superiority of DRA with PT over DRO for decreasing disruptive behaviors while simultaneously increasing a desirable replacement behavior. However, that study was not able to evaluate the separate versus combined effects of DRA and PT. This purpose of this study is to extent LeGray et al. (2010) by evaluating the separate and combined effects of DRA and PT.

Research Questions

The following research questions will be evaluated:

1. Are there more immediate intervention effects on occurrence of appropriate behavior for DRA with PT versus DRA alone?
2. Over the course of intervention, are there differences in the occurrence of appropriate behavior for DRA with PT versus DRA alone?
3. Over the course of intervention, are there differences in the occurrence of inappropriate behavior for DRA with PT versus DRA alone?

CHAPTER III

METHOD

Participants and Setting

The participants included four preschool children. Each of the students was referred for services due to repeated occurrences of a disruptive vocalizations and indicated lack of appropriate responding during small group instruction. Participants were selected based upon the following criteria: (a) the child was enrolled in a preschool program, (b) consent from the child's legal guardian(s) was provided, (c) consent from the child's classroom teacher was provided, (d) the child's disruptive behavior was frequent and observable, and (e) the child did not have a function-based individualized behavior intervention plan in place. All sessions were conducted within each child's designated preschool classroom located in a rural, southeastern state.

Charlie

Charlie was a 4-year-old African American male enrolled in a Head Start classroom. Charlie had no previous diagnoses and had never been exposed to a behavior intervention plan developed from a FBA process. Charlie was referred for engaging in frequent inappropriate vocalizations during group instruction. These inappropriate vocalizations included talking at unacceptable times and disrespectful comments toward others. Charlie's teacher indicated that his problem behaviors were very frequent, very unmanageable, and often resulted in the disruption of their daily group instruction sessions.

Dee

Dee was 4-year-old African American female enrolled in a Head Start classroom. Dee had no previous diagnoses or special education ruling and had never been exposed to a behavior intervention plan developed from a FBA process. Dee was referred for services due to her frequent engagement in excessive talking during group instruction. Dee's teacher indicated that she often did not follow along with group instruction and would frequently try to talk to her peers instead of answering task related questions. It was also reported that these inappropriate vocalizations were very disruptive to group instruction and were highly unmanageable.

Mac

Mac was a 6-year-old African American male enrolled in a kindergarten classroom. Mac had no previous diagnoses or special education ruling and had never been exposed to a behavior intervention plan developed from an FBA process. Mac was referred for services due to his frequent engagement in irrelevant and inappropriate vocalizations that would occur during the morning group instruction activity in his classroom. Mac's teacher indicated that he would often blurt out words or false answers purposefully in an effort to disrupt the activity. Mac's teacher indicated that these inappropriate vocalizations were highly disruptive and very unmanageable.

Artemis

Artemis was 6-year-old African American female enrolled in a kindergarten classroom. Artemis had no previous diagnoses or special education ruling and had never been exposed to a behavior intervention plan developed from a FBA process. Artemis was referred for services due to her frequent engagement in excessive talking during

group instruction. Artemis's teacher indicated that she often did not follow along with group instruction and would frequently try to talk to her peers instead of answering task related questions. It was also reported that these inappropriate vocalizations very disruptive to group instruction and were highly unmanageable.

Materials

Functional Assessment Informant Record for Teachers Pre-School Version (FAIR-T Pre-School Version)

The interview component of each FBA was conducted through the use of the Functional Assessment Informant Record for Teachers Preschool Version (see Appendix A). The Fair-T Preschool Version is a modified version of the FAIR-T which has been used as an integral component of the FBA process (e.g., Doggett et al., 2001; Edwards, 2002), and is used to gather information regarding target behaviors and the environmental conditions in which the behaviors occurred. The FAIR-T Preschool Version is divided into four sections. The first section is dedicated to gathering information regarding child demographic data as well as information addressing the student's compliance, work completion, and accuracy of their work. This section also pinpoints any days or times that would be acceptable to observe the student within the classroom setting. The second section asks the teacher to identify one to three problem behaviors in ranked order based on the severity of the behavior. Each behavior is then rated by the teacher on different dimensions that include: (a) manageability, (b) intensity, (c) frequency, and (d) duration. Section three consists of questions that aim to gather information that can be used to generate hypotheses regarding the antecedent events that are associated with the occurrence of the targeted problem behavior(s). Section four consists of questions that

aim to gather information about consequences that typically follow the targeted problem behavior(s). Once the information in section four is gathered, hypotheses can then be developed regarding the consequences that could potentially be maintaining the specified problem behavior(s). Preliminary research has indicated that data from the FAIR-T Preschool version matches results from direct-descriptive assessments and brief functional analyses, and may be useful for intervention development (Dufrene et al., 2007; LeGray et al., 2010; Poole, 2009).

Assessment Rating Profile (ARP-R)

The Assessment Rating Profile-Revised (ARP-R; Eckert, Hintze, & Shapiro, 1999) was used to evaluate each teacher's acceptability of the FBA procedures used in this study (see Appendix B). The ARP-R is a one-factor 12-item Likert scale that assesses the general acceptability of assessment procedures. The ARP-R consists of a six-point Likert scale that provides a response continuum that ranges from *Strongly Disagree* (1) to *Strongly Agree* (6). The range of scores from the ARP-R is 12 to 72. The ARP-R has demonstrated strong internal consistency (Eckert et al., 1999). The ARP was slightly modified for use in this study. Specifically, the instrument was modified so that present tense items were altered to read as past tense items. Also, the term school psychologist was replaced with teacher.

The *Intervention Rating Profile-15* (IRP-15; Martens, Witt, Elliott, & Darveux, 1985) was given to each teacher at the completion of the study and was used to assess the teachers' treatment satisfaction with the interventions that were implemented with their student (see Appendix C). The IRP-15 consists of a 15-question Likert scale that ranges from *Strongly Disagree* (1) to *Strongly Agree* (6). Ratings on the IRP-15 range from a

total score of 15-90, with lower score indicating less acceptability by the rater. A total score above 52.5 represents an "acceptable" rating (Von Brock & Elliott, 1987). The IRP-15 has established internal consistency (Cronbach alpha = .98; Martens et al., 1985).

Dependent Measures and Independent Variables

The study had two primary dependent measures. The first dependent measure was the occurrence of appropriate vocalizations. Appropriate vocalizations were defined as any task relevant vocalization or verbal noise made by the child. The definition included such things as verbally responding to a question and making appropriate sounds (e.g., letter sounds) related to a presented demand/question. The second dependent measure was the occurrence of inappropriate vocalizations. Inappropriate vocalizations were defined as any task irrelevant vocalization or verbal noise made by the child. The definition included such things as humming, making unusual vocal noises, speaking to other children, whispering, making noises with one's teeth or swearing. A partial interval recording system was used for recording occurrence of the dependent measures. The system was determined based on the topography of the target behaviors, as identified by the referring teacher. The targeted disruptive behavior and appropriate replacement behavior was determined based on the results of each child's FBA.

All observations sessions were conducted using the partial interval recording system. An Mp3 player and headphones were used to cue the observers to record the occurrence of the dependent measures every 10 s. All sessions were conducted within each child's classroom and were 10 minutes in length.

Design and Analyses

The study incorporated the use of a classroom-based brief functional analysis based on the work of Boyajian et al. (2001). The classroom-based analysis utilized a brief multi-element design with four conditions: (a) control (free play), (b) attention, (c) tangible, and (d) escape. Each condition lasted 10 min, and conditions were conducted on separate days due to the relatively short duration of the target activity. A contingency reversal phase (i.e., B-A-B) was also conducted for each student as a demonstration of the potency of the proposed maintaining variable that was identified during each student's brief functional analysis. Data from the brief functional analysis were visually analyzed. Each condition from the brief FA produced a value that was graphed based on its corresponding value representing the occurrence of the target behavior within that condition. Once graphed, the experimenter then visually analyzed the data to determine which condition was associated with the highest level of the target behavior.

A BCBC design was used to evaluate the relative effectiveness of the intervention conditions. The BCBC design included two conditions. One condition consisted of a modified DRA intervention strategy that incorporated the use of a function-based intervention with a pre-teaching component. During this intervention the student was instructed on relevant behavioral expectations that included encouraging the use of appropriate vocalizations, while refraining from engaging in inappropriate vocalizations. In addition to the pre-teaching component, a function-based intervention strategy was implemented which included withholding reinforcement upon the student's engagement in inappropriate vocalizations and providing reinforcement contingent upon the first instance of an appropriate vocalization following a 30s absence of the inappropriate

vocalization. The pre-teaching component was operationally defined through collaboration with the classroom teacher and was systematically structured to promote the standardization of its implementation by the classroom teacher. Each student's targeted inappropriate behavior was the same behavior of concern that was reported upon referral for services. Appropriate replacement behaviors were also based on teacher nomination and operationally defined through collaboration with the classroom teacher. Behavioral function was determined through the FBA process. The second condition included the DRA intervention component described in the first condition, with the exception that the pre-teaching component was not included.

Based on the nature of the current study, repeated observations of the same participants at different points in time provide data that are dependent on each other (i.e., an individual's score at a later occasion can, in part, be predicted by his or her score at a prior occasion). Due to this serial dependence, the independence of observations assumption of many statistical analyses is violated. Simulation studies suggest that multilevel modeling can be used to test the statistical significance of intervention effects in multiple baseline designs with at least four participants due to the ability to model the serial dependence of observations from the same individual (Ferron, Bell, Hess, Rendina-Gobioff, & Hibbard, 2009). Multilevel modeling for multiple baseline designs (Ferron et al., 2009; Van den Noortgate & Onghena, 2003) was used to determine if mean differences in appropriate and inappropriate vocalizations in PT+DRA and DRA conditions were statistically significant after accounting for serial dependence and to calculate effect size estimates for the magnitude of differences between conditions.

A BCBC design was used to evaluate the relative effectiveness of two intervention conditions. Two of the participants were exposed to the interventions in the order of BCBC, while the other two participants were exposed to the interventions in the order of CBCB. The BCBC design allowed for visual inspection of the data in an effort to evaluate the effectiveness of the two conditions. Through visual analysis, the experimenter then determined the level, trend, and stability associated with each condition across the design. Based on the visual inspection of the data, a determination was then made as to which of the two conditions had a greater impact on increasing the designated appropriate replacement behavior while simultaneously decreasing problem behavior.

Procedure

The initial step in the study was to complete an FBA for each participant. Each FBA included a teacher interview and a brief functional analysis. The teacher interview was accomplished by administering the FAIR-T P.

Teacher Interview

The experimenter interviewed each teacher of each participant using the FAIR-T-P in a semi-structured interview format. Each interview was conducted in a quiet room removed from distractions. The experimenter possessed a printed copy of the interview and presented each question while querying for more information when deemed necessary (e.g., follow-up questions for facilitating operational definitions). Interviews were conducted at a time identified by the teacher as convenient and occurred in a location that included minimal distractions.

Brief Multiple-Stimulus Preference Assessment

In order to ensure the potency of the tangible reinforcer that was used during the tangible condition of the brief functional analysis, the experimenter conduct a brief multiple-stimulus preference assessment prior to the functional analysis. The procedural outline of the preference assessment was based on the work done by Carr, Nicolson, and Higbee (2000). Prior to the functional analysis, each participant was exposed to an array of eight stimuli arranged on a table. The participant was then instructed to select one object from the table. If the participant failed to respond, the instruction was repeated. After the object was selected, the participant was given 10 s of access to the object before it was removed and placed away from the table. The remaining stimuli were then repositioned in a random order. The selection process was continued until all stimuli had been selected. Based on the selection process, percentages were calculated by dividing the number of times a stimulus was chosen by the number of trials in which was available. Percentages were ranked from 1 (highest) to 8 (lowest). This process was conducted before any functional analyses were initiated. Only highly ranked stimuli were used during tangible conditions.

Brief Functional Analysis

The experimental functional analyses were conducted by the primary experimenter for each participant within each participant's classroom setting. The experimental functional analysis aimed to identify the consequence(s) that most likely maintained the targeted problem behavior. The experimental functional analysis was conducted through the use of an individualized protocol, and was developed based on the results of the FAIR-T preschool version. During the functional analyses, data were recorded indicating the percentage of interval occurrence of the targeted disruptive

behavior within each experimental condition. The procedures used in the experimental functional analysis were based on the procedures used by Boyajian et al. (2001).

The functional analysis consisted of four experimental conditions that isolated four different consequent events. Through the process of isolating each of these consequences, a statement was then made about which variable(s) was most likely maintaining the target behavior. The order of experimental conditions were selected in a random fashion by writing the name of each condition on a sheet of paper, placing all of the sheets into a hat, and drawing each sheet until no sheets remained. Each condition lasted 10 min, and there was a 2-min break between sessions.

Tangible Condition

Prior to the tangible condition, the experimenter gave the student free access to a preferred item for a period of 2 min (see Appendix D for protocol). Once the actual condition began, the experimenter then removed the preferred item from the participant. The classroom teacher then began the group instruction activity. For the duration of the tangible condition, the tangible item was presented to the participant, contingent on the occurrence of an inappropriate vocalization. After 30 s had elapsed, the experimenter then removed the tangible from the participant's possession. No other consequences were provided during the tangible condition.

Control

During the control condition, the participant had free access to toys and activities typically provided to preschool students (see Appendix E for protocol). No demands were placed on the student during this time, and the experimenter position himself near the participant and provide intermittent noncontingent attention every 30-s. Any instance of

the target behavior was ignored. Intermittent noncontingent attention refers to the experimenter providing neutral comments (e.g. “You’ve got a cat in the wall,” or “Who dat”), directed at the participant at pre-determined points in time.

Attention

In the attention condition, the experimenter removed all preferred items from the participant and then the classroom teacher began the predetermined activity (i.e., same task provided during tangible condition) (see Appendix F for protocol). After the task had been presented, the experimenter then told the participant that he had to do some work now. The experimenter then engaged in work related materials. During this condition, the experimenter refrained from providing any verbal or physical attention to the participant in the absence of the target behavior. Contingent upon the occurrence of the target behavior, the experimenter provided the student with verbal attention in the form of a reprimand (“No, don’t do that”, “Stop that”). After attention had been provided, the experimenter then returned to his work related materials.

Escape

In the escape condition, the classroom teacher began the group instruction activity (i.e., same task provided during tangible condition) (see Appendix G for protocol). The task was terminated for 30 s contingent upon the occurrence of the targeted inappropriate behavior. After a task has been removed, the experimenter withheld any verbal or physical attention. Following the 30-second escape interval, the task was then represented. If the student did not comply with the task demand, and did not exhibit the targeted inappropriate behavior, a three prompt hierarchy was then used. The three prompt hierarchy consisted of: (a) verbal command, (b) verbal command and gesture, and

(c) physical guidance. When each task was verbally presented, the participant then had 5 seconds to initiate engagement in behaviors that associated with the completion of the task. If the participant did not comply, and did not engage in the target behavior, the task would be represented verbally accompanied by a gesture toward something relevant to task completion. If the participant still did not comply, the experimenter then physically guided the participant through the completion of the task.

Intervention Analysis

A BCBC design was used to evaluate the relative effectiveness of two intervention conditions. Two of the participants were exposed to the interventions in the order of BCBC, while the other two participants were exposed to the interventions in the order of CBCB. By counterbalancing the sequence of exposure to the two intervention conditions across the four participants, an attempt was be made to reduce the potential of ordering effects. The target inappropriate behavior and appropriate replacement behavior corresponded to the behaviors of concern that resulted in the participant's referral. Behavioral function was determined through the FBA process. The intervention conditions each consisted of a DRA intervention strategy, which included withholding reinforcement upon the student's engagement in the inappropriate vocalizations and providing reinforcement contingent upon the first instance of an appropriate vocalization following a 30-s absence of inappropriate behavior. The B condition consisted of implementing the DRA intervention in isolation. The C condition consisted of a DRA intervention strategy that also included a pre-teaching component. During C sessions the student was instructed on relevant behavioral expectations that included refraining from engaging in inappropriate vocalizations and encouraging the use of the appropriate

vocalizations. The pre-teaching component was operationally defined and systematically structured to promote the standardization of its implementation by the classroom teacher.

The BCBC design allowed for visual inspection of the data in effort to evaluate the effectiveness of the two conditions. Through visual analysis of the data, the experimenter determined the level, trend, and stability associated with each condition and phase change. Through visual inspection of the data, a determination was then made as to which of the two conditions had a greater impact on increasing appropriate vocalizations, while simultaneously decreasing inappropriate vocalizations.

Intervention

Once the FBA process was completed for each child, two separate behavior intervention plans were developed for each student. Two different conditions were evaluated in the study: (a) DRA intervention condition and (b) Pre-Teaching + DRA intervention condition (PT+DRA). The DRA intervention strategy examined the effects of placing inappropriate vocalizations on extinction and reinforcing appropriate vocalizations. The PT+DRA intervention condition assessed the effects of the combined use of pre-teaching methods with a function-based DRA intervention strategy in which inappropriate vocalizations were placed on extinction and appropriate vocalizations were reinforced.

The first intervention strategy consisted of the DRA intervention component in isolation. The DRA intervention included the use of a protocol that was developed for the classroom teacher that provided step-by-step instructions in regard to the implementation of the condition. Each DRA protocol was operationally defined based on the targeted inappropriate and appropriate behavior for each student. The DRA protocol also

instructed the teacher on how to withhold reinforcement from the student contingent upon the occurrence of inappropriate vocalizations and how to provide reinforcement contingent upon the occurrence of appropriate vocalizations (see Appendix H for an example protocol). The second intervention strategy consisted of the DRA intervention component, with the addition of a pre-teaching (PT) component. The PT+DRA intervention included the use of two protocols that were developed for the classroom teacher that provided step-by-step instructions in regard to the implementation of the condition. Each PT protocol was operationally defined based on the targeted inappropriate behavior and appropriate replacement behavior. The PT protocol also provided a clear description of what was expected of the student during the corresponding session (see Appendix I for protocol). The DRA protocol also instructed the teacher on how to withhold reinforcement from the student contingent upon the occurrence of inappropriate vocalizations and how to provide reinforcement contingent upon the occurrence of appropriate vocalizations (see Appendix H for an example protocol).

During the first intervention condition (DRA), the classroom teacher implemented the DRA protocol that was designed to instruct the teacher on her behavioral response to the occurrence of the student's inappropriate vocalizations and appropriate vocalizations. Based on the DRA protocol, the teacher was instructed to withhold all forms of the proposed maintaining form of reinforcement, unless signaled by the primary experimenter. A "thumbs up" from the experimenter was used to signal the initiation of the identified form of reinforcement.

The second intervention condition (PT+DRA) consisted of two teacher implemented components: (a) PT and (b) DRA. Prior to the start of the PT+DRA session, the teacher took the student to a quiet corner of the room and read through the pre-teaching protocol with the student. The pre-teaching protocol provided the behavioral expectations for the student relating to the targeted inappropriate behavior and encouraged the use of the targeted appropriate replacement behavior during the upcoming session. Once the teacher had read the scripted protocol to the student, the teacher then asked the student two questions based on the content of the PT protocol (see Appendix J for example protocol). If the student answered any question incorrectly, the teacher then provided the answer, waited 5 seconds, and then repeated the question. Once the student had answered both questions correctly, the teacher then returned to the predetermined activity with the student and the DRA component of the session began. In the DRA component of the intervention, the classroom teacher implemented the DRA protocol. Based on the DRA protocol, the teacher was instructed to withhold all forms of the proposed maintaining reinforcer, unless signaled by the primary experimenter. A "thumbs up" from the experimenter was used to signal the initiation of the identified form of reinforcement.

Interobserver Agreement, Procedural and Treatment Integrity

Interobserver Agreement (IOA) was evaluated for 42.8% of the functional analysis sessions. For Charlie, Dee, Mac, and Artemis IOA was collected during 50%, 50%, 50%, and 38.4% of the intervention sessions, respectively. IOA was calculated as the total number of agreements (occurrence and nonoccurrence) divided by the total number of agreements plus disagreements and multiplied by 100. School psychology

graduate students were trained to conduct observations and 90% agreement with the primary investigator was used as criterion for observers. If an observer's average agreement fell below 90% then they were retrained on observation procedures until they again met the 90% criterion. Procedural integrity observations were conducted for 100% of the functional analysis sessions (see Appendix L-O for protocols). If procedural integrity fell below 90% then those implementing conditions were retrained. Treatment integrity data were collected for 100% of the intervention sessions (see Appendixes P, Q, and R for protocols).

Average IOA estimates for the initial brief functional analysis by participant were 98.3% for Charlie, 98.8% for Dee, 100% for Mac, and 100% for Artemis. Procedural integrity for brief FA conditions was 100% across all sessions for all participants.

IOA for intervention sessions for Dee averaged 97.2% (range, 96.6% - 100%). Treatment integrity for Dee was 100% for all sessions. IOA for intervention sessions for Mac averaged 96.8% (range, 95% - 98%). Treatment integrity for Mac's intervention sessions yielded an average of 98.5% integrity (range, 96.8%-100%). IOA for intervention sessions for Artemis averaged 94.3% (range, 91.6% - 96.6%). Treatment integrity for Artemis' intervention sessions was 100% for all sessions.

CHAPTER IV

RESULTS

Brief Functional Analysis

Charlie's teacher, Ms. Reynolds, identified inappropriate vocalizations as the primary problem behavior. Additionally, She indicated that she would like Charlie to engage in more task relevant vocalizations during direct instruction. Moreover, she indicated that inappropriate vocalizations were most often followed by access to social attention in the form of reprimands. Results observed from the brief functional analysis for Charlie are shown in Figure 1. During the free play condition, Charlie's inappropriate vocalizations occurred in only 1.6% of the observed intervals. During the escape condition, Charlie engaged in inappropriate vocalizations during 5% of the observed intervals. The tangible condition showed that Charlie engaged in inappropriate vocalizations during 3.3% of the observed intervals. During the attention condition, Charlie inappropriately vocalized during 18.3% of the observed intervals. To further demonstrate a functional relationship between the attention condition and the increases in percentage occurrence of inappropriate vocalizations, a contingency reversal was implemented. During the first contingency reversal condition, Charlie engaged in inappropriate vocalizations during 8.3% of the observed intervals. When the attention condition was re-implemented, Charlie's inappropriate vocalizations increased and were observed during 15.3% of the observed intervals. A final reversal of the attention contingency showed that Charlie's inappropriate vocalizations decreased and were observed during 8.3% of the observed intervals.

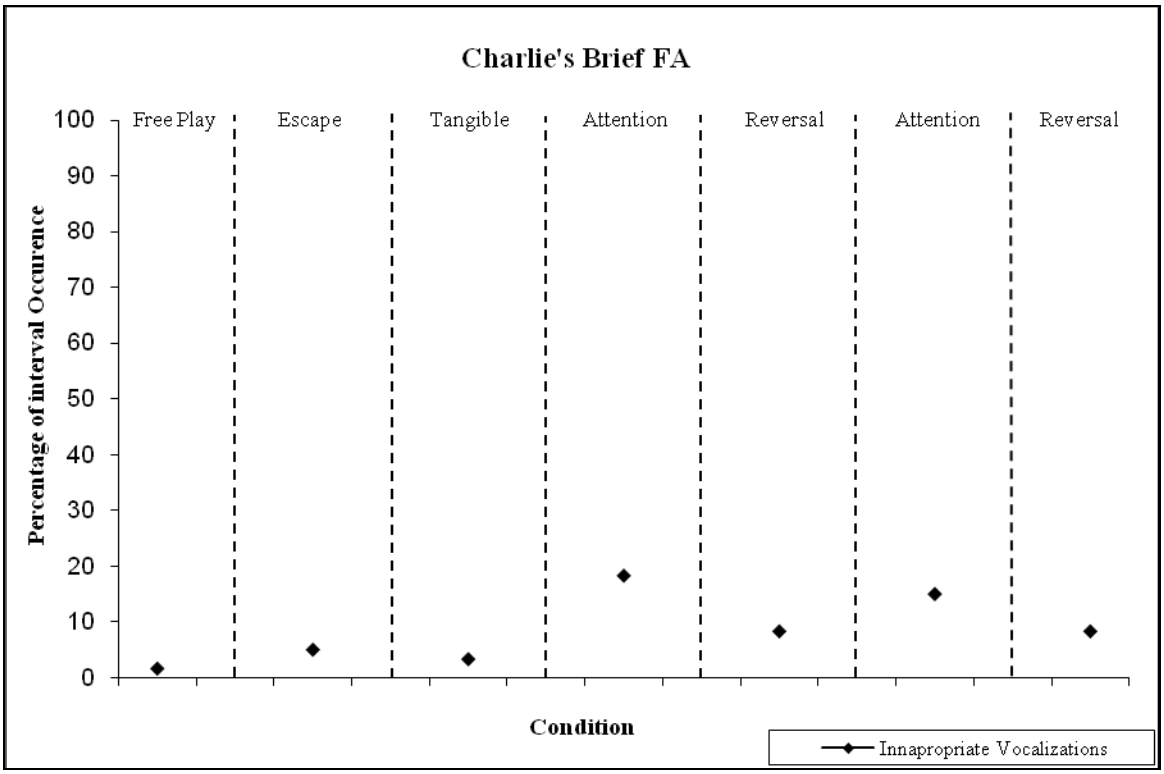

Figure 1. Data shown indicate the percentage of interval occurrence that corresponds to Charlie's engagement in inappropriate vocalizations during the brief functional analyses. The highest levels of behavior where witnessed during the attention conditions.

The results observed from the brief functional analysis for Dee are shown in Figure 2. During the tangible condition, Dee engaged in inappropriate vocalizations during 3.3% of the observed intervals. During the escape condition, Dee's inappropriate vocalizations occurred in 1.6% of the observed intervals. The free play condition showed that Dee engaged in inappropriate vocalizations during 1.6 of the observed intervals. During the attention condition, Dee inappropriately vocalized during 10% of the observed intervals. To further demonstrate a functional relationship between the attention condition and the increases in occurrence of inappropriate vocalizations, a contingency reversal was implemented. During the first contingency reversal condition, Dee did not engage in any inappropriate vocalizations during any of the observed intervals. When the attention condition was re-implemented, Dee's inappropriate vocalizations increased and were

observed during 6.6% of the observed intervals. A final reversal of the attention contingency showed that Dee's inappropriate vocalizations decreased and were observed during 1.6% of the observed intervals.

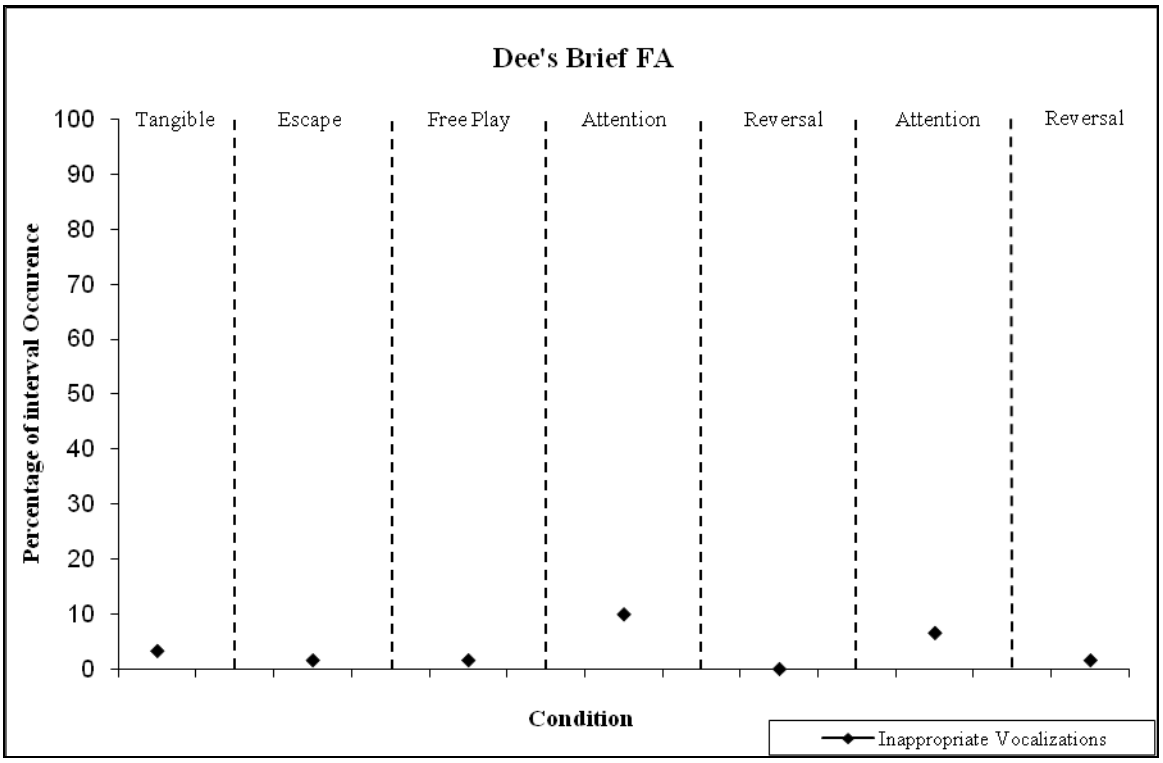

Figure 2. Data shown indicate the percentage of interval occurrence that corresponds to Dee's engagement in inappropriate vocalizations during the brief functional analyses. The highest levels of behavior where witnessed during the attention conditions.

The results observed from the brief functional analysis for Mac are shown in Figure 3. During the free play condition, Mac engaged in inappropriate vocalizations during 1.6% of the observed intervals. During the attention condition, Mac's inappropriate vocalizations occurred during 16.6% of the observed intervals. The escape condition showed that Mac engaged in inappropriate vocalizations during 1.6% of the observed intervals. During the tangible condition, Mac did not inappropriately vocalize during any of the observed intervals. To further demonstrate a functional relationship

between the attention condition and the increases in occurrence of inappropriate vocalizations, a contingency reversal was implemented. During the first contingency reversal condition, Mac engaged in inappropriate vocalizations during 1.6% of the observed intervals. When the attention condition was re-implemented, Mac's inappropriate vocalizations increased and were observed during 11.6% of the observed intervals. A final reversal of the attention contingency showed that Mac's inappropriate vocalizations did not occur at all during the observation.

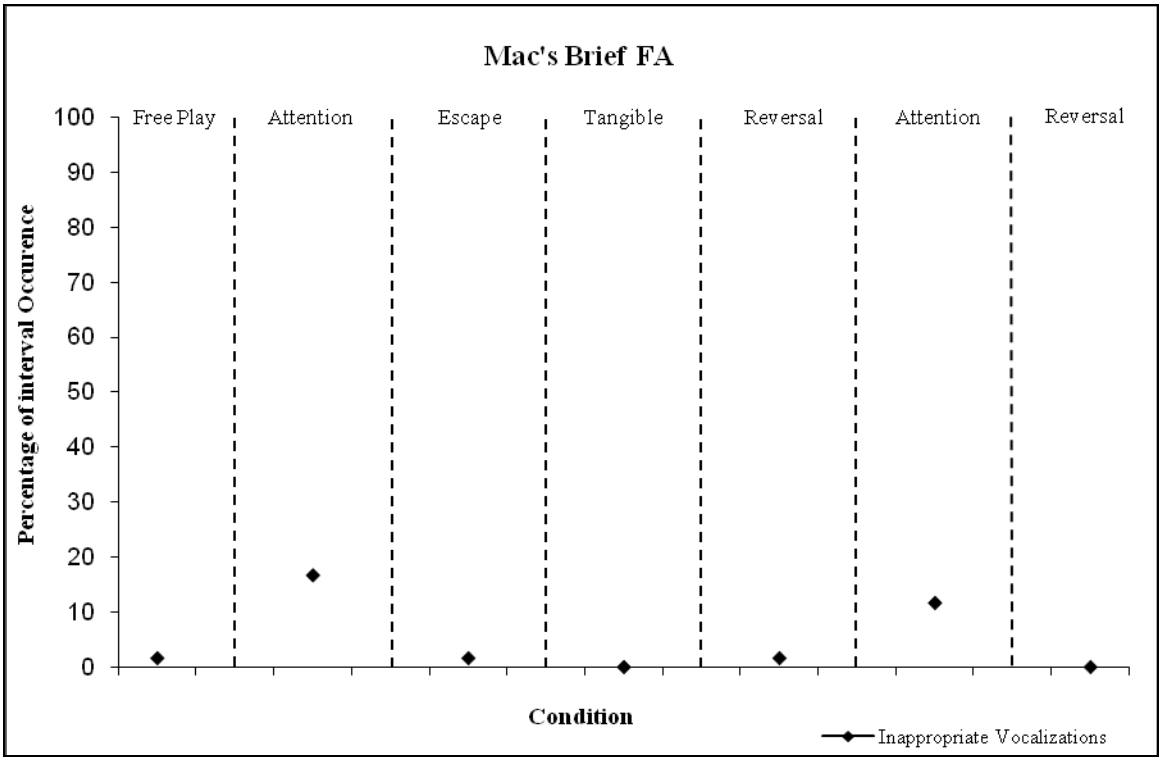

Figure 3. Data shown indicate the percentage of interval occurrence that corresponds to Mac's engagement in inappropriate vocalizations during the brief functional analyses. The highest levels of behavior where witnessed during the attention conditions.

The results observed from the brief functional analysis for Artemis are shown in Figure 4. During the escape condition, Artemis engaged in inappropriate vocalizations during 1.6% of the observed intervals. During the tangible condition, Artemis's

inappropriate vocalizations occurred during 1.6% of the observed intervals. The attention condition showed that Artemis engaged in inappropriate vocalizations during 15% of the observed intervals. During the free play condition, Artemis did not inappropriately vocalize during any of the observed intervals. To further demonstrate a functional relationship between the attention condition and the increases in occurrence of inappropriate vocalizations, a contingency reversal was implemented. During the first contingency reversal condition, Artemis did not engage in inappropriate vocalizations during any of the observed intervals. When the attention condition was re-implemented, Artemis's inappropriate vocalizations increased and were observed during 8.3% of the observed intervals. A final reversal of the attention contingency showed that Artemis's inappropriate vocalizations did not occur at all during the observation.

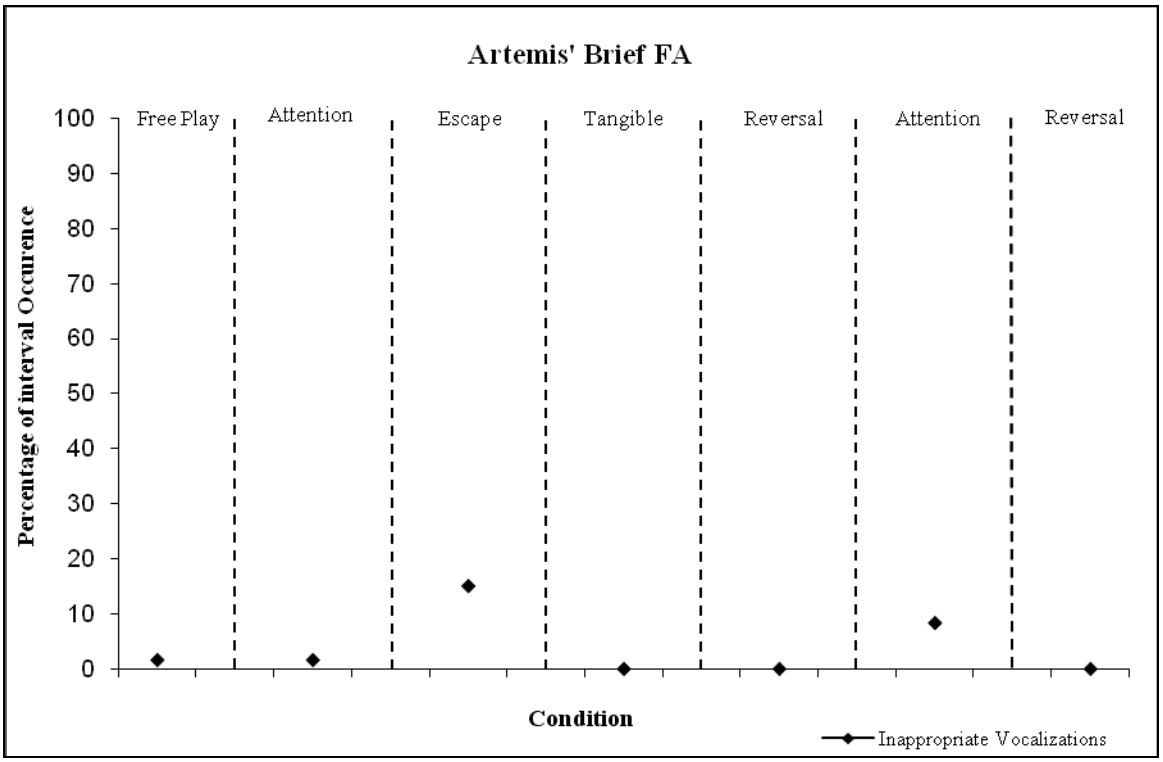

Figure 4. Data shown indicate the percentage of interval occurrence that corresponds to Artemis' engagement in inappropriate vocalizations during the brief functional analyses. The highest levels of behavior where witnessed during the attention conditions.

Intervention

Charlie

Figure 5 shows intervention data for Charlie's inappropriate vocalizations across the BCBC design. During the initial DRA phase, Charlie engaged in a stable level of inappropriate vocalizations and averaged 15.5% during the observed intervals (range, 15% - 16.6). The first session of PT+DRA resulted in a decrease in level for inappropriate vocalizations, and average level during the phase was 15.5% (range, 8.3% - 26.6%). After changing phases to the second DRA phase, implementation produced a slight rise in inappropriate behavior to an average of 21% (range, 16.6% - 25%). Following the final phase change, implementation of the second PT+DRA condition resulted in decreases for Charlie's inappropriate vocalizations to his lowest level during the study, producing an average of 10.5% of the observed intervals (range, 6.6% -15%).

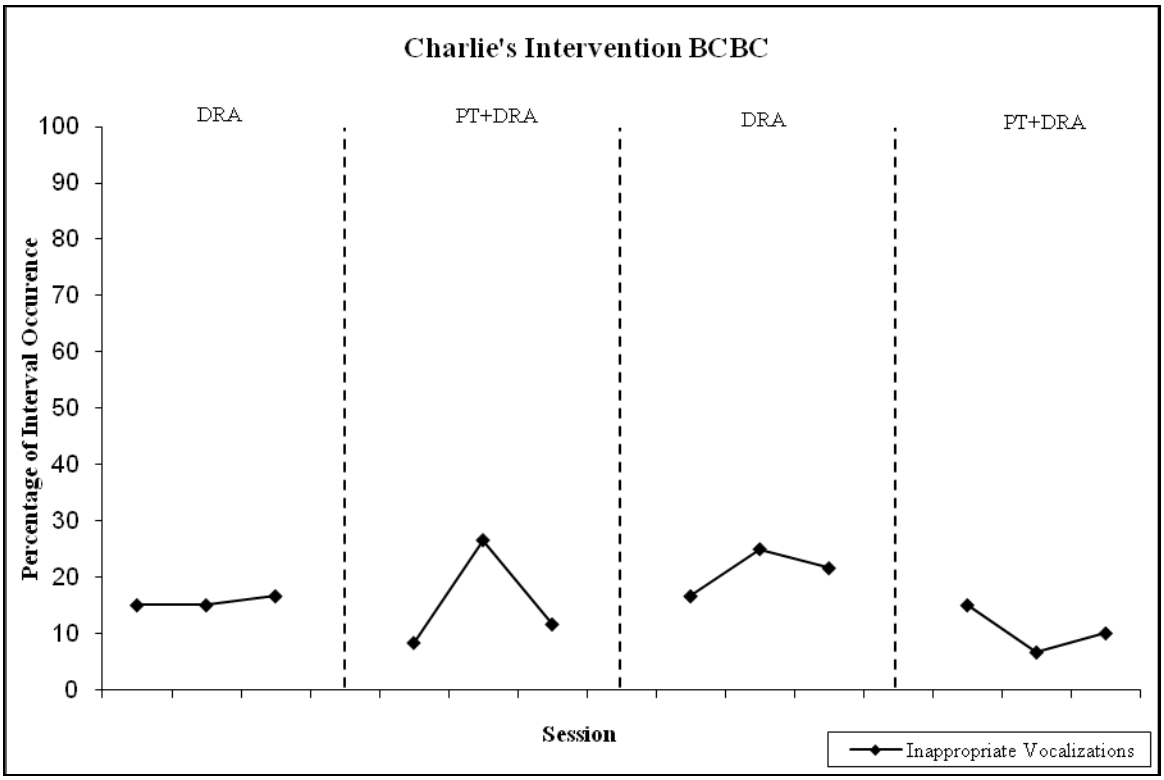

Figure 5. Data shown indicate the percentage of interval occurrence that corresponds to Charlie's engagement in inappropriate vocalizations during each treatment phase. The lowest levels of behavior where witnessed during the PT+DRA conditions.

Figure 6 shows intervention data for Charlie's appropriate vocalizations across the BCBC design. During the initial DRA phase, Charlie engaged in fairly stable level of appropriate vocalizations and averaged 29.28% during the observed intervals (range, 23.3% - 34.4%). The implementation of the first PT+DRA condition showed an immediate rise in level and produced a slight upward tread resulting in an average of 34.4% (range, 33.3% - 36.6%) After changing phases to the second DRA phase, implementation produced an immediate and large decrease in appropriate vocalizations, producing an average of 22.7% (range, 18.3% - 25%). Following the final phase change, implementation of the second PT+DRA phase increased Charlie's appropriate

vocalizations to his highest level during the study, producing an average of 36.6% of the observed intervals (range, 35% -38.3%).

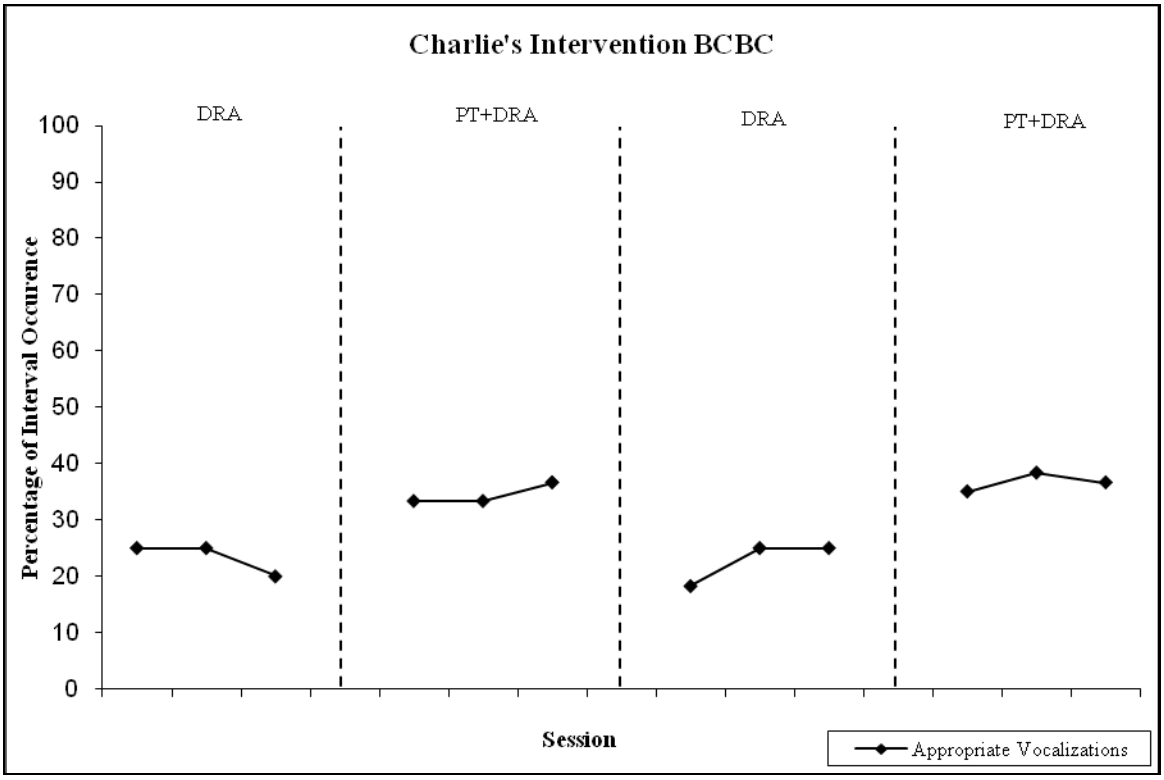

Figure 6. Data shown indicate the percentage of interval occurrence that corresponds to Charlie's engagement in appropriate vocalizations during each treatment phase. The highest levels of appropriate responding where witnessed during the PT+DRA conditions.

Dee

Figure 7 shows intervention data for Dee's inappropriate vocalizations across the CBCB design. During the initial PT+DRA phase, Dee engaged in low and stable level of inappropriate vocalizations, averaging 1.6% during the observed intervals (range, 0% - 5%). The implementation of the first DRA condition showed an immediate rise in level and produced an average of 5.5% (range, 5% - 6.6%) After changing phases to the second PT+DRA phase, implementation produced an immediate decrease to zero in inappropriate vocalizations and yielded an average of .5% (range, 0% - 1.6%) across the

phase. Following the final phase change, implementation of the second DRA condition subsequently increased Dee's inappropriate vocalizations to her highest level during the study, producing an average of 6% of interval occurrence (range, 5% -6.6%).

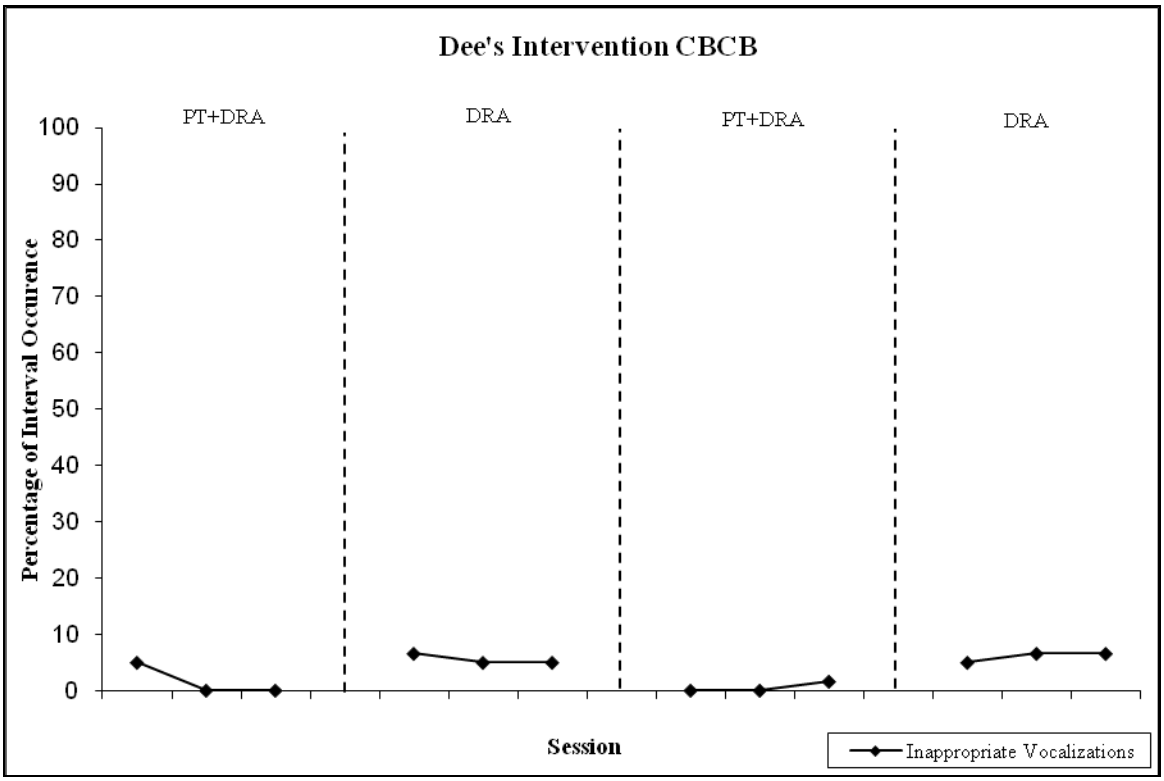

Figure 7. Data shown indicate the percentage of interval occurrence that corresponds to Dee's engagement in inappropriate vocalizations during each treatment phase. The lowest levels of behavior where witnessed during the PT+DRA conditions.

Figure 8 shows intervention data for Dee's appropriate vocalizations across the CBCB design. During the initial PT+DRA phase, Dee's data displayed a steadily increasing level of appropriate vocalizations, producing an average of 83.8% during the observed intervals (range, 55% - 71.6%). The implementation of the first DRA condition showed an immediate decrease in level and produced a steady trend with an average of 50.5% (range, 50% - 53.3%) across the phase. After changing phases to the second PT+DRA phase, implementation produced an immediate and large increase in

appropriate vocalizations, producing an average of 68.3% (range, 60% - 73.3%). Following the final phase change, implementation of the second DRA phase yielded an immediate decrease in the level of Dee's appropriate vocalization. The final DRA phase produced an average of 51% of the observed intervals (range, 43.3% -61.6%).

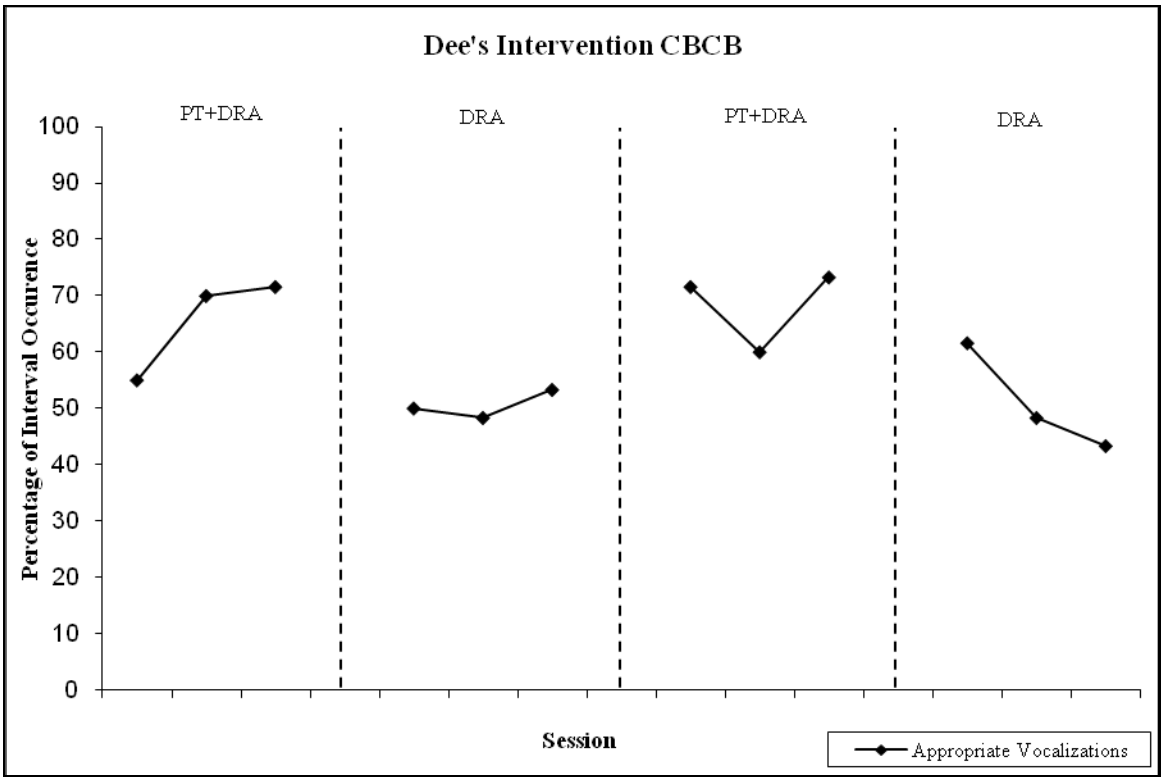

Figure 8. Data shown indicate the percentage of interval occurrence that corresponds to Dee's engagement in appropriate vocalizations during each treatment phase. The highest levels of appropriate responding where witnessed during the PT+DRA conditions.

Mac

Figure 9 shows intervention data for Mac's inappropriate vocalizations across the CBCB design. During the initial PT+DRA phase, Mac engaged in low and stable level of inappropriate vocalizations, averaging 1% during the observed intervals (range, 0% - 1.6%). The implementation of the first DRA phase showed an immediate rise in the level of inappropriate vocalizations and produced an average of 9.4% (range, 8.3% - 11.6%) After changing phases to the second PT+DRA phase, implementation produced a

decrease in inappropriate behavior to an average of 3.8% (range, 3.3% - 5%). Following the final phase change, implementation of the second DRA phase, an immediate rise in Mac's inappropriate vocalizations was witnessed. The final DRA phase produced an average of 9.4% of the observed intervals (range, 8.3% -10%).

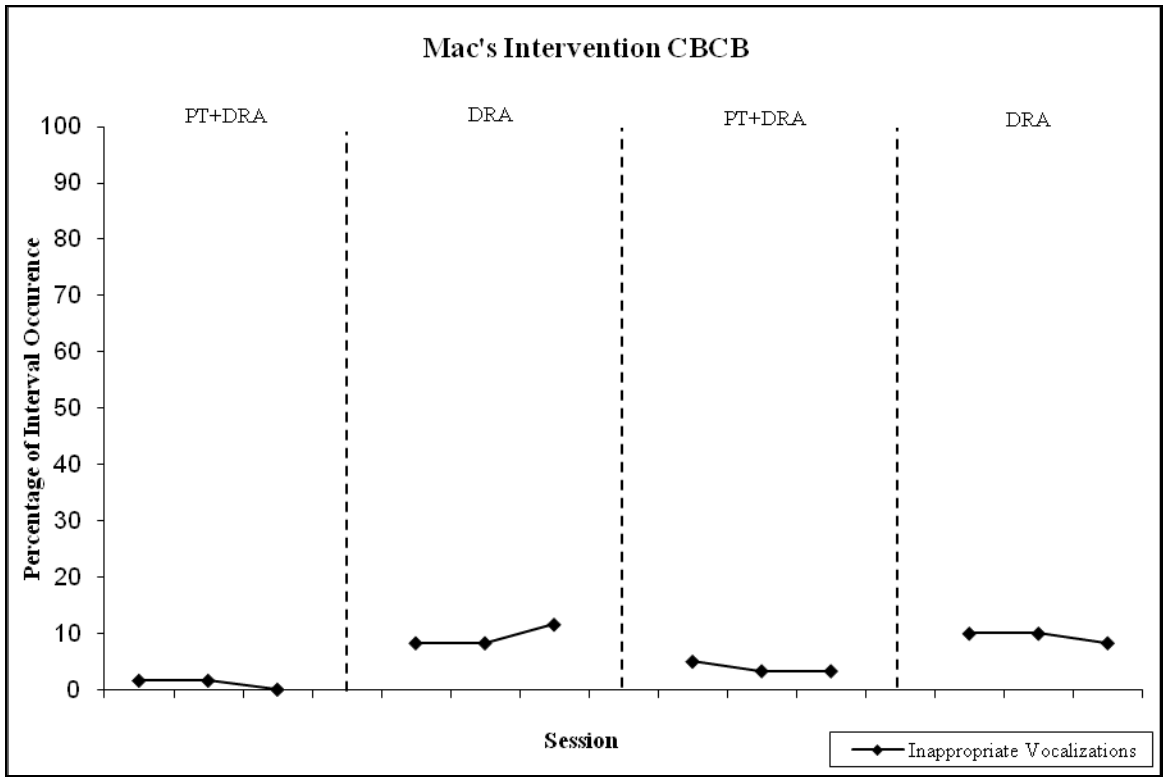

Figure 9. Data shown indicate the percentage of interval occurrence that corresponds to Mac's engagement in inappropriate vocalizations during each treatment phase. The lowest levels of behavior where witnessed during the PT+DRA conditions.

Figure 10 shows intervention data for Mac's appropriate vocalizations across the CBCB design. During the initial PT + DRA phase, Mac's data demonstrated an increasing trend of appropriate vocalizations, averaging 64.9% of the observed intervals (range, 61.6% - 70%). The implementation of the first DRA session resulted in an immediate decrease in level and appropriate behaviors averaged 36.7% of the observed intervals (range, 35% - 43.3%) After changing phases to the second PT+DRA phase,

implementation produced an immediate and substantial increase in appropriate vocalizations, producing an average of 79.88% (range, 76.6% - 78.3%). Following the final phase change, implementation of the second DRA phase, Mac's level of appropriate vocalizations immediately decreased and resulted in an average of 36.6% of the observed intervals (range, 35% -38.3%) across the phase.

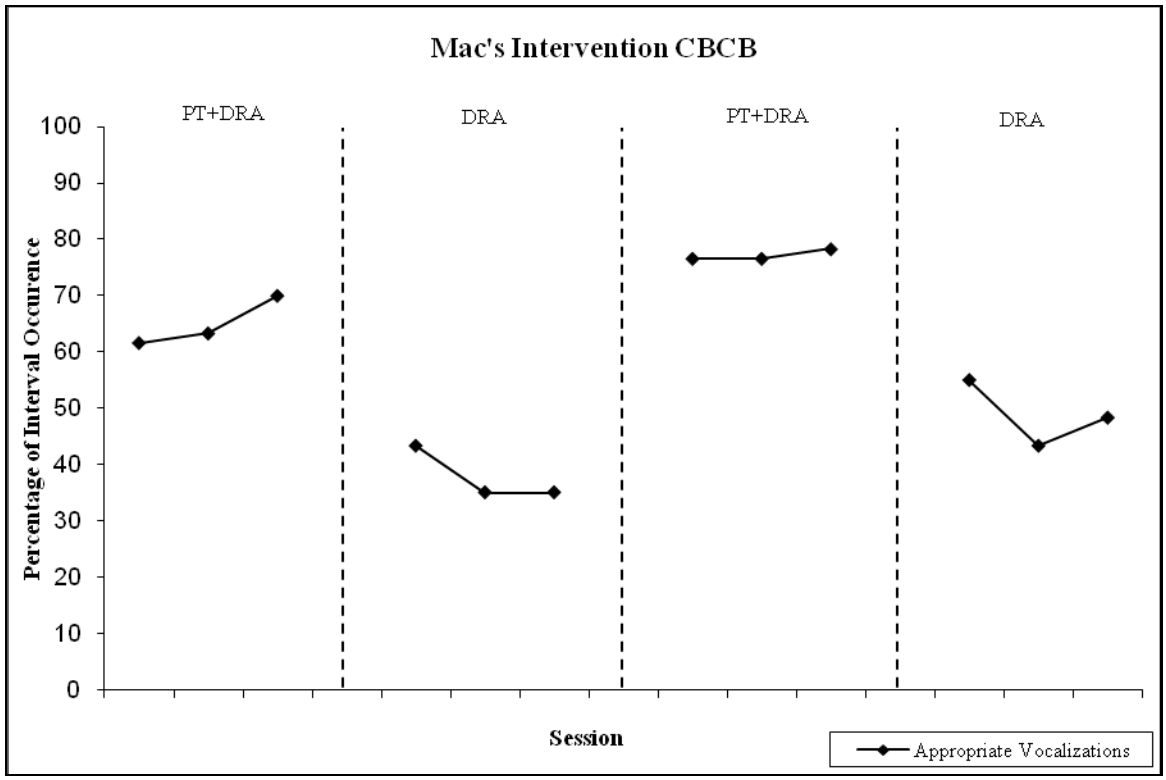

Figure 10. Data shown indicate the percentage of interval occurrence that corresponds to Mac's engagement in appropriate vocalizations during each treatment phase. The highest levels of appropriate responding where witnessed during the PT+DRA conditions.

Artemis

Figure 11 shows intervention data for Artemis's inappropriate vocalizations across the BCBC design. During the initial DRA phase, Artemis engaged in a somewhat variable level of inappropriate vocalizations, averaging 14.12% during the observed intervals (range, 6.6% - 20%). The implementation of the first PT+DRA session showed an immediate decrease in level and produced an average of 1% (range, 0% - 1.6%) After

changing phases to the second DRA phase, implementation produced an immediate rise in inappropriate vocalizations an averaged 8.8% (range, 8.3% - 10%) across the phase. Following the final phase change, implementation of the second PT+DRA condition reduced Artemis's inappropriate vocalizations to her lowest level witnessed during the study, producing an average of 0.5% of interval occurrence (range, 0% -1.6%).

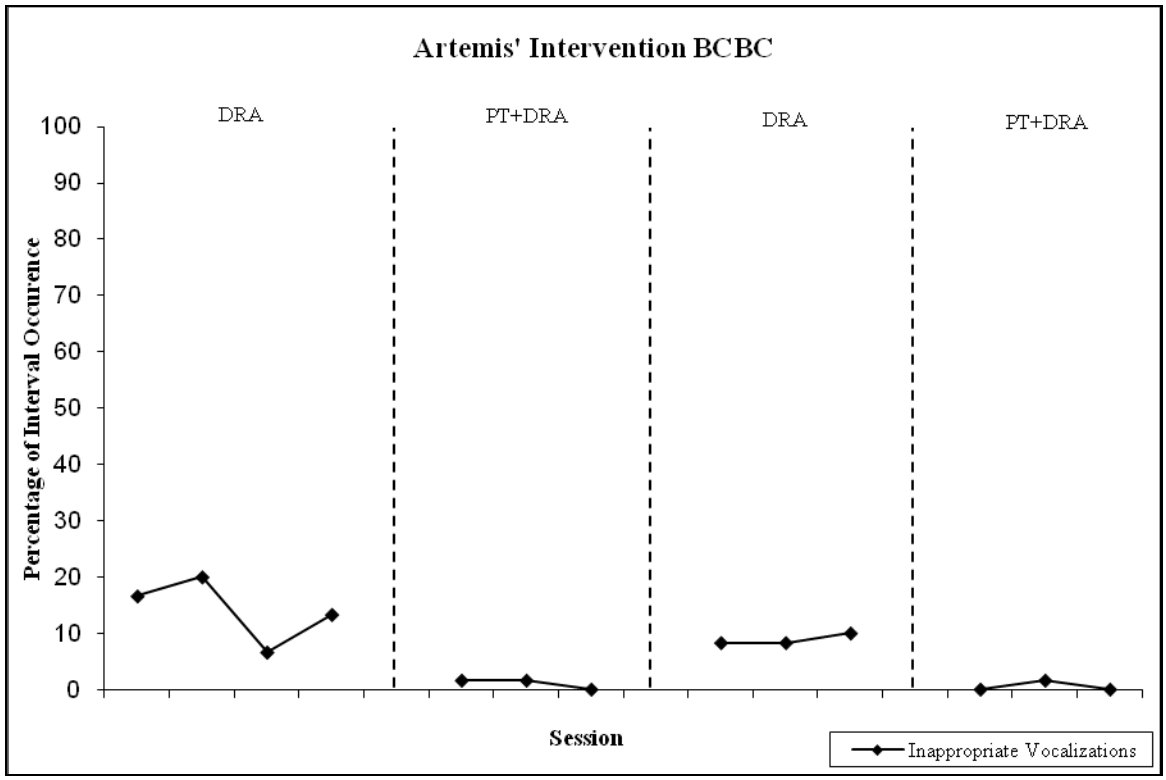

*Figure 11.*Data shown indicate the percentage of interval occurrence that corresponds to Artemis' engagement in inappropriate vocalizations during each treatment phase. The lowest levels of behavior where witnessed during the PT+DRA conditions.

Figure 12 shows intervention data for Artemis's appropriate vocalizations across the BCBC design. During the initial DRA phase, Artemis engaged in a variable level of appropriate vocalizations and averaged 37.4% of the observed intervals (range, 31.6% - 46.6%). The implementation of the first PT+DRA session resulted in an immediate rise in level and produced a steady increasing tread with an average of 67.7% (range, 61.6.3% -

75%) After changing phases to the second DRA phase, implementation produced an immediate decrease in appropriate vocalizations, producing an average of 52.1% (range, 46.6% - 58.3%).Following the final phase change, implementation of the second PT+DRA condition immediately and substantially increased Artemis's appropriate vocalizations to her highest level witnessed during the study, producing an average of 81% of the observed intervals (range, 76.6% -83.3%).

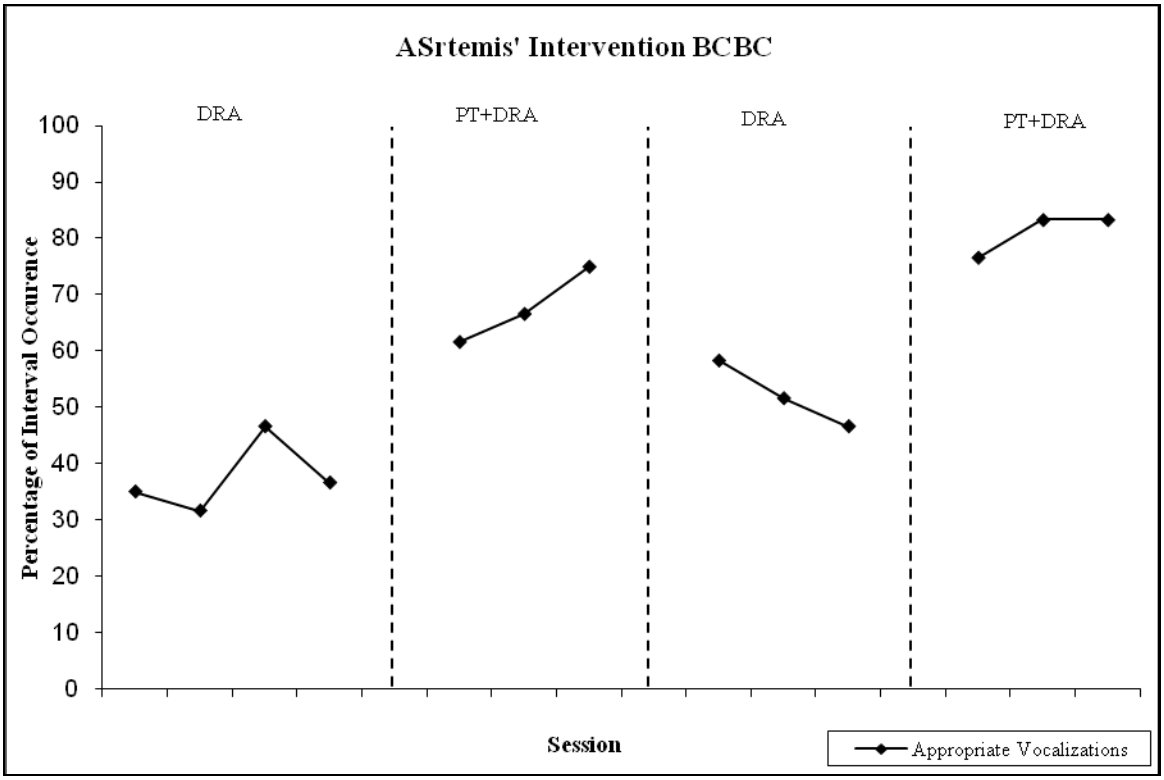

*Figure 12.*Data shown indicate the percentage of interval occurrence that corresponds to Artemis' engagement in appropriate vocalizations during each treatment phase. The highest levels of appropriate responding where witnessed during the PT+DRA conditions.

Treatment Acceptability

Each teacher completed the ARP-R at the completion of the FBA process. Overall, all the teachers indicated high acceptability with the assessment process. All responses on the ARP-R indicated that the teacher either agreed or strongly agreed with

every item on the ARP-R. Mrs. Reynolds reported a score of 65 for both Charlie and Dee. Ms. McPoyle reported a total score of 72 for Mac and Artemis.

Each teacher also completed the IRP-15 at the conclusion of each child's participation in the study. Overall, the teachers found the intervention process to be acceptable, beneficial, and appropriate. Mrs. Reynolds reported total scores of 79 and 82 for Charlie and Dee. Mrs. McPoyle reported a total score of 82 and 83 for Mac and Artemis. A total score above 52.5 represents an "acceptable" rating (Von Brock & Elliott, 1987), which suggests that both teachers were very accepting of the intervention process.

Statistical Analyses

In an effort to calculate average intervention effects and the statistical significance of the differences across conditions, multilevel modeling for multiple baseline data was used (Ferron et al., 2009; Van der Noortgate & Onghena, 2003). Results include estimates of fixed effects, which describe the mean differences in the dependent variables across phases, and covariance parameters, which describe variability in the intervention effects across participants as well as the amount of serial dependence in scores from the same participant.

All results are presented in Table 1. Estimates of fixed effects can be interpreted to determine the average percentage of intervals with inappropriate and appropriate vocalizations in the PT+DRA and DRA intervention conditions and to test the statistical significance of the difference in mean intervals across conditions. In Table 1, the intercept fixed effects provide the average percent of intervals with the dependent variable during the PT+DRA condition. In the PT+DRA condition, appropriate vocalizations occurred during an average of 60.99% of the observed intervals.

Additionally, inappropriate vocalizations occurred during an average of 4.33% of intervals. In Table 1, the DRA fixed effects present the mean difference in intervals with the dependent variable across the DRA and PT+DRA conditions. In the DRA condition, appropriate vocalizations occurred during an average of 20.72% of observed intervals fewer (i.e., 40.78% of intervals) than in the PT+DRA condition. Furthermore, inappropriate vocalizations occurred during 7.09% percent of intervals more (i.e., 11.40% of intervals) than in the PT+DRA condition. The statistical significance of the fixed effects is also presented in Table 1. The statistical significance of the intercepts only indicates that the average percent of intervals during PT+DRA is significantly different from zero and is not of primary theoretical interest. In contrast, the statistically significant fixed effects for DRA indicate that the differences in appropriate and inappropriate vocalizations across conditions were unlikely to be observed by chance alone ($p < .05$ for both variables).

Table 1

Multilevel Analyses Examining Differences between Conditions

	Dependent Variable			
	Appropriate Vocalizations		Inappropriate Vocalizations	
Parameter	Estimate	*SE*	Estimate	*SE*
Fixed Effects				
Intercept	60.99**	8.11	4.33	2.73
DRA	-20.72*	4.04	7.09*	1.37

Table 1 (continued).

	Dependent Variable			
	Appropriate Vocalizations		Inappropriate Vocalizations	
Parameter	Estimate	*SE*	Estimate	*SE*
Covariance Parameters				
Intercept	237.06	217.79	26.96	23.79
DRA	47.09	53.72	2.44	6.10
AC-1	.64	.18	.15	.17
Residual	74.26	36.31	14.08	3.46

Note. $^{**}p < .01$, $^{*}p < .05$

The intercept and DRA values in the covariance parameters in Table 1 present the variance of the mean percent of intervals during PT+DRA (intercept) and in the difference between conditions (DRA). The values for the first-order autocorrelation coefficients (AC-1) indicate the amount of serial dependence for each dependent variable and are interpreted on the same scale as Pearson correlation coefficients. The values for the residual variances can be used to calculate standardized mean difference effect size similar to Cohen's (1988) *d.* Specifically, the value of the DRA fixed effects, which represents the magnitude of differences between the DRA and PT+DRA conditions was divided by the square root of the residual variance. For appropriate vocalizations, the effect size was equal to 20.72/8.62, indicating that there was a 2.40 *SD* difference

between DRA and PT+DRA. For inappropriate vocalizations, the effect size was equal to 7.09/3.75, indicating that there was a 1.89 *SD* difference between DRA and PT+DRA. Both effect sizes appear typical for single-case graphs judged to be effective. For example, a review of 200 published AB contrasts found an average effect size of $d = 1.70$ (Parker & Vannest, 2009).

CHAPTER V

DISCUSSION

School psychologists have a variety of procedures to choose from when providing recommendations for classroom-based behavioral interventions. Combining the use of pre-teaching and differential reinforcement within an intervention package is one component to consider when intervening effectively within the classroom (LeGray et al., 2010). The current study provides a unique contribution to the differential reinforcement literature base as it relates to preschool classroom-based interventions for children without developmental disabilities. Specifically, a direct-comparison of two DRA-based interventions, one with a pre-teaching component and one without is provided. Results from this study demonstrated that the use of pre-teaching produced the highest mean levels of appropriate vocalizations and lowest level of inappropriate vocalizations for all four participants. Both intervention approaches placed inappropriate behavior on extinction, while providing contingent reinforcement for an appropriate replacement behavior. However, the use of pre-teaching proved superior for optimal performance for appropriate vocalizations.

The results of the study suggest that in an effort to facilitate behavior change through DRA, it was optimal to incorporate the use of pre-teaching behavioral expectations. One explanation for these findings is that these children may have been unable to adequately adjust their behavior following the extinction component of DRA, due to the lack of previous contact between the appropriate behavior and the functional reinforcer for inappropriate behavior. While the individual may spontaneously emit novel responses following extinction (i.e., extinction burst), there is no guarantee that the

individual will spontaneously emit behaviors considered appropriate by important individuals in their environment. In fact, the individual may simply engage in the inappropriate response at a greater intensity and/or rate in an effort to contact reinforcement. Therefore, filling the appropriate behavioral void can be accomplished through pre-teaching students what is expected of them and indicating how reinforcement can be obtained. Through the use of pre-teaching habilitative replacement behaviors, combined with the differential reinforcement of those behaviors, an interventionist can facilitate enhanced outcomes for children.

Pre-teaching expected behaviors was likely beneficial for participants given their developmental level and relatively limited learning history for appropriate classroom vocalizations during academic instruction. Specifically, all participants were in preschool and between the ages of 4 and 6 years old. Therefore, they each had limited school experience with classroom instruction. Based on their limited exposure to instruction, it is likely that pre-teaching behavioral expectations highlighted both acceptable and unacceptable student behavior that would have otherwise been unknown to the participants. As a result, pre-teaching likely enhanced skill development for children and increased their behavioral repertoire for appropriate classroom behavior. Moreover, pre-teaching may have served as a discriminative stimulus in that children were learned which behaviors would subsequently be reinforced in class.

These results provide further evidence that DRA procedures are effective and acceptable for classroom use with typically developing preschool children. Previous research with DRA has almost exclusively included individuals with developmental disabilities engaging in destructive or stereotypic behaviors (Petscher, Rey, & Bailey,

2009). Few studies (e.g., LeGray et al., 2010) demonstrated the effectiveness of DRA in preschool classrooms with typically developing children. LeGray et al. (2010) found DRA to be effective for reducing children's disruptive behaviors and teachers rated the procedure as acceptable in their classroom. The potential for successful effective use of DRA within preschool settings is promising. However, it is important that the literature continues to explore DRA intervention approaches within the general education setting.

This study also extends the FBA literature base in some important ways. First, this study demonstrates the usefulness of FBA in preschool settings with children who do not have developmental disabilities. FBA research in preschool with typically developing children is relatively limited (Carter, & Horner, 2007; LeGray et al., 2010). However, more recently investigations have been conducted that have shown how useful the FBA process can be in the development of function-based intervention strategies to be used within the preschool population (Carter & Horner, 2007; Dufrene et al., 2007; LeGray et al., 2010; VanDerHeyden, Witt, & Gatti, 2001). As the literature base involving FBA within preschool grows, researchers will gain more insight into the utility of identifying the behavioral function of problem behaviors common to this population. The current study offers not only an addition to the literature on the general use of FBA in preschool classrooms, but also offers a unique example of how identifying behavioral function can lend itself to the development of effective function based interventions within this population. The study included brief functional analyses of children's inappropriate classroom behaviors and assessment data were used to develop effective classroom-based interventions. Specifically, analysis data allowed for the development

of DRA procedures with pre-teaching that effectively reduced problem behaviors while simultaneously increasing appropriate replacement behaviors.

In addition to further demonstrating the usefulness of FBA with preschool children, this study has applied implications for developing interventions based on results from a functional assessment. Previous studies evaluating function-based interventions for preschool children have not always included DRA procedures (Allen & Harris, 1966; Dufrene et al., 2007; Perrin, Perrin, Hill, & DiNovi, 2008). For example, some studies have focused strictly on using DRO as the sole means of decreasing problem behavior without taking into account the alternative behavioral outcome that is produced once that behavior has dissipated. When focusing only on decreasing a particular problem behavior, as is the case with DRO, we fail to promote the use of adaptive replacement behaviors. In the case of DRA, the aim is to eliminate a problem behavior while simultaneously attempting to increase the occurrence of some appropriate behavior that can adaptively replace the preexisting problem behavior. By focusing on not only the problem behavior, but also promoting the use of a replacement behavior, an intervention will inherently increase the potential for strong social validity (Gresham, 1985).

Results from this study also extend the small literature base for the FAIR-T P. The FAIR-T P was developed to provide an indirect functional assessment instrument specifically designed for preschool populations and settings (Dufrene et al., 2007). This study provides further demonstration of the usefulness of the FAIR-T P. Specifically, in the case of all four participants, the results from the FAIR-T P matched what was found in the corresponding brief FA. For all three participants, the identified behavioral function was consistent between each participants FAIR-T P and their brief FA. The

congruence between these measures suggests that the FAIR-T P is an instrument that holds good criterion related validity. Furthermore, these implications speak to the utility of the combination of these two measures in identifying behavioral function to be used in a function based intervention with preschool students. Finally, this study extends use of the FAIR-T P in terms of settings. Dufrene and colleagues study was conducted in Head Start and daycare classrooms only, whereas this study included use of the FAIR-T P in a kindergarten classroom in a public school.

While the current study contributes to the literature base on the applied use of functional assessment and differential reinforcement procedures in preschool settings, there are some limitations that should be taken into account. One limitation that must be considered is the age range and race of all four participants. A focus of this study was to evaluate the use of these interventions on the pre-school population. Due to this focus and the availability of participants, all four participants were African American and attended preschool. Future research on this topic should consider evaluation of these interventions across multiple age groups and educational levels. Moreover, future research may include children from various racial and ethnic backgrounds as well as those who attend preschool settings other than Head Start and kindergarten. Such research might expand the external validity of the current findings.

A second limitation to the study was that the targeted inappropriate behavior for all four participants was inappropriate vocalizations. Additionally, the replacement behavior for all children was appropriate vocalizations. As a result, it is unknown if similar results would be obtained for different target and replacement response classes. Future research should aim to evaluate these assessments and interventions across a range

of disruptive classroom behaviors. Expanding to include a wide range of behavioral concerns would greatly expand the external validity of the current findings.

A third limitation was that the current investigation did not include a follow-up phase to assess whether teacher intervention implementation and student behavioral gains were maintained at a desirable level following the end of data collection. The purpose of the current study was to determine whether or not there were relatively immediate differential effects for PT+DRA and DRA procedures on children's inappropriate and appropriate behaviors. As a result, long-term implementation and effectiveness were not evaluated. The current study suggests that there may be differences between PT+DRA and DRA procedures, so future research may evaluate the extent to which the DRA and pre-teaching procedures are implemented with integrity and children continue to respond positively to intervention. Finally, future research may evaluate various fading schedules for the pre-teaching procedure used in this study.

Despite limitations, the current study provides some important contributions to the FBA and differential reinforcement literatures as they pertain to preschool settings. The current study provides a unique example of the utility of assessment data in the development of effective function based intervention for preschool students. The congruence between assessment components suggests that these measures can be used in combination to produce successful preschool interventions. The current study also further extends the literature base on the use of pre-teaching behavioral expectations prior to using differential reinforcement procedures with typically developing preschool students. More specifically, the current study provides preliminary indication that using DRA may

not be as effective in comparison to PT+ DRA when attempting to decrease problem behavior and simultaneously increase appropriate behavior in the preschool setting.

APPENDIX A

FUNCTIONAL ASSESSMENT INFORMANT RECORD FOR TEACHERS-

PRESCHOOL VERSION

If information is being provided by both the Teacher and the Classroom Aide, indicate both respondents' names. In addition, in instances where divergent information is provided, note the sources of specific information.

Student:_____

Respondent(s):_____

School:_____ Age:_____ Sex: M F

Date:_____

1. Describe the referred student. What is he/she like in the classroom? (Write down what you believe is the most important information about the referred student.)

_____
_____
_____
_____

2. Pick a second student of the same sex who is also difficult to manage. What makes the referred student more difficult than the second student?

_____
_____
_____
_____

3. a. Is the student's developmental age equivalent to their chronological age ?

_____

b. What is your estimate of the student's developmental age?

_____

4. a. Are the student's social skills developmentally appropriate?

_____

b. Does the student's social skills represent a behavioral excess or deficit?

_____

5. a. What percentage of requests does the student comply with the first time presented? (0 - 100%)?

_____

b. What percentage will they eventually comply with?

_____

c. What is the student's accuracy for compliance (0 - 100%)?
_____

6. a. What is the student's percentage of work completion (0-100%)
_____
b. What is the student's accuracy of completed work (0-100%)
_____

7. Does the student receive any regular medications?
_____ Yes _____ No If yes, briefly explain:
_____
_____
_____

8. Does the student have any diagnosed medical conditions?
_____ Yes _____ No If yes, briefly explain:
_____
_____
_____

9. Please describe this student's strengths.
_____
_____

10. What procedures have you tried in the past to deal with this student's problem behavior?
_____
_____
_____

Have previous procedures been successful? Why? Why not?
_____
_____
_____

11. Describe your current class-wide behavior management plan.
_____
_____
_____
_____

12. Does the student and/or their family receive services in the home? If so, what types of services?

_____
_____
_____
_____

13. Briefly list below the student's typical daily schedule of activities.

Time	Activity	Time	Activity
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

14. When during the day (two classroom <u>activities</u> and <u>times</u>) does the student's problem behavior(s) typically occur?

Classroom Activity #1_____
Time_____

Classroom Activity #2_____
Time_____

15. Please indicate <u>good days</u> and <u>times</u> to observe. (At least two observations are needed.)

<u>Observation #1</u>	<u>Observation #2</u>	<u>Observation #3</u>(Back-up)
Date_____	Date_____	Date_____
Time_____	Time_____	Time_____

Problem Behaviors

Please list one to three problem behaviors in order of severity. Do not use a general description such as "disruptive" but give the actual behavior such as "doesn't stay in his/her seat", or "talks out without permission".

1. _____
_____
2. _____
_____
3. _____
_____

1. Rate how *manageable* the behavior is:
   - a. Problem Behavior 1 — 1 2 3 4 5 (Unmanageable ... Manageable)
   - b. Problem Behavior 2 — 1 2 3 4 5 (Unmanageable ... Manageable)
   - c. Problem Behavior 3 — 1 2 3 4 5 (Unmanageable ... Manageable)

2. Rate how *disruptive* the behavior is:
   - a. Problem Behavior 1 — 1 2 3 4 5 (Mildly ... Very)
   - b. Problem Behavior 2 — 1 2 3 4 5 (Mildly ... Very)
   - c. Problem Behavior 3 — 1 2 3 4 5 (Mildly ... Very)

3. How often does the behavior occur *per day* (please circle)?
   - a. Problem Behavior 1 — <1-3 4-6 7-9 10-12 >13
   - b. Problem Behavior 2 — <1-3 4-6 7-9 10-12 >13
   - c. Problem Behavior 3 — <1-3 4-6 7-9 10-12 >13

4. How *long* does the behavior last?
   - a. Problem Behavior 1 — < 1 min 1-5 min 6-10 min >10 min
   - b. Problem Behavior 2 — < 1 min 1-5 min 6-10 min >10 min
   - c. . Problem Behavior 3 — < 1 min 1-5 min 6-10 min >10 min

5. How many *months* has the behavior been present?
   - a. Problem Behavior 1 — <1 2 3 4 entire school year
   - b. Problem Behavior 2 — <1 2 3 4 entire school year

c. Problem Behavior 3 <1 2 3 4 entire school year

Antecedents: Problem Behavior #_____:_____ Yes No

1. Does the behavior occur more often during a certain *type* of task? _____ _____

2. Does the behavior occur more often during *easy* tasks? _____ _____

3. Does the behavior occur more often during *difficult* tasks? _____ ____

4. Does the behavior occur more often during *new* tasks? _____ _____

5. Does the behavior occur more often when a request is made to *stop* an activity? _____ _____

6. Does the behavior occur more often when a request is made to *begin a new activity*? _____ _____

7. Does the behavior occur more often during *transition* periods? _____ _____

8. Does the behavior occur more often when a *disruption* occurs in the student's normal routine? _____ _____

9. Does the behavior occur more often when the student's *request has been denied*? _____ _____

11. Does the behavior occur more often with a *specific person?* _____ _____

12. Does the behavior occur more often when a *specific person is not there*? _____ _____

13. Are there any other behaviors that usually *precede* the problem behavior? _____ _____

14. Is there anything you could do that would *ensure* the occurrence of the behavior? _____ _____

15. Are there any events occurring in the child's *home* that seem to precede occurrence of the behavior at school? _____ _____

16. Does the behavior occur more often in *certain settings*? (circle all that apply) _____ _____

large group small group independent work one-to-one interaction

bathroom playground cafeteria bus

other:_____

Antecedents: Problem Behavior #_____:_____ Yes No

1. Does the behavior occur more often during a certain *type* of task? _____ _____

2. Does the behavior occur more often during *easy* tasks? _____ _____

3. Does the behavior occur more often during *difficult* tasks? _____ ____

4. Does the behavior occur more often during *new* tasks? _____ _____

5. Does the behavior occur more often when a request is made to *stop* an activity? _____ _____

6. Does the behavior occur more often when a request is made to *begin a new activity*? _____ _____

7. Does the behavior occur more often during *transition* periods? _____ _____

8. Does the behavior occur more often when a *disruption* occurs in the student's normal routine? _____ _____

9. Does the behavior occur more often when the student's *request has been denied*? _____ _____

11. Does the behavior occur more often with a *specific person?* _____ _____

12. Does the behavior occur more often when a *specific person is not there*? _____ _____

13. Are there any other behaviors that usually *precede* the problem behavior? _____ _____

14. Is there anything you could do that would *ensure* the occurrence of the behavior? _____ _____

15. Are there any events occurring in the child's *home* that seem to precede occurrence of the behavior at school? _____ _____

16. Does the behavior occur more often in *certain settings*? (circle all that apply) _____ _____

large group small group independent work one-to-one interaction

bathroom playground cafeteria bus
other:_____

Antecedents: Problem Behavior #_____:_____ Yes No

1. Does the behavior occur more often during a certain *type* of task? _____ _____

2. Does the behavior occur more often during *easy* tasks? _____ _____

3. Does the behavior occur more often during *difficult* tasks? _____ _____

4. Does the behavior occur more often during *new* tasks? _____ _____

5. Does the behavior occur more often when a request is made to *stop* an activity? _____ _____

6. Does the behavior occur more often when a request is made to *begin a new activity*? _____ _____

7. Does the behavior occur more often during *transition* periods? _____ _____

8. Does the behavior occur more often when a *disruption* occurs in the student's normal routine? _____ _____

9. Does the behavior occur more often when the student's *request has been denied*? _____ _____

11. Does the behavior occur more often with a *specific person?* _____ _____

12. Does the behavior occur more often when a *specific person is not there*? _____ _____

13. Are there any other behaviors that usually *precede* the problem behavior? _____ _____

14. Is there anything you could do that would *ensure* the occurrence of the behavior? _____ _____

15. Are there any events occurring in the child's *home* that seem to precede occurrence of the behavior at school? _____ _____

16. Does the behavior occur more often in *certain settings*? (circle all that apply) _____ _____

large group small group independent work one-to-one interaction

bathroom playground cafeteria bus
other:_____

Consequences: Problem Behavior #_____:_____

1. Please indicate whether the following consequences occur after the behavior is exhibited.

Consequence	Yes	No
Access to Preferred Activity	_____	_____
Termination of Task	_____	_____
Rewards	_____	_____
Peer Attention	_____	_____
Teacher Attention	_____	_____
Praise	_____	_____
Ignore	_____	_____
Re-direction	_____	_____
Interrupt	_____	_____
Reprimand	_____	_____
Corporal Punishment	_____	_____

2. Is there any task you have stopped presenting to the student as a result of the problem behavior?
_____ Yes _____ No

If yes, describe:_____

3. Are there other problem behaviors that often occur after the behavior is exhibited?
_____ Yes _____ No

If yes, describe:_____

4. Does the student typically receive praise or any positive consequence when behavior occurs that you would like to see instead of the problem behavior?
_____ Yes _____ No

Comments:_____

Consequences: Problem Behavior #_____:_____

1. Please indicate whether the following consequences occur after the behavior is exhibited.

Consequence	Yes	No
Access to Preferred Activity	_____	_____
Termination of Task	_____	_____
Rewards	_____	_____
Peer Attention	_____	_____
Teacher Attention	_____	_____
Praise	_____	_____
Ignore	_____	_____
Re-direction	_____	_____
Interrupt	_____	_____
Reprimand	_____	_____
Corporal Punishment	_____	_____

2. Is there any task you have stopped presenting to the student as a result of the problem behavior?
_____ Yes _____ No

If yes, describe:_____

3. Are there other problem behaviors that often occur after the behavior is exhibited?
_____ Yes _____ No

If yes, describe:_____

4. Does the student typically receive praise or any positive consequence when behavior occurs that you would like to see instead of the problem behavior?
_____ Yes _____ No

Comments:_____

Consequences: Problem Behavior #_____:_____

1. Please indicate whether the following consequences occur after the behavior is exhibited.

Consequence	Yes	No
Access to Preferred Activity	_____	_____
Termination of Task	_____	_____
Rewards	_____	_____
Peer Attention	_____	_____
Teacher Attention	_____	_____
Praise	_____	_____
Ignore	_____	_____
Re-direction	_____	_____
Interrupt	_____	_____
Reprimand	_____	_____
Corporal Punishment	_____	_____

2. Is there any task you have stopped presenting to the student as a result of the problem behavior?
_____ Yes _____ No

If yes, describe:_____

3. Are there other problem behaviors that often occur after the behavior is exhibited?
_____ Yes _____ No

If yes, describe:_____

4. Does the student typically receive praise or any positive consequence when behavior occurs that you would like to see instead of the problem behavior?
_____ Yes _____ No

Comments:_____

APPENDIX B

ASSESSMENT RATING PROFILE-REVISED (ARP-R)

Please circle the number that best describes your agreement or disagreement with each statement.

Statement	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
1. This was an acceptable assessment strategy for the child's problems	1	2	3	4	5	6
2. Most teachers would find this approach to assessment appropriate for problems in addition to this child's current problems	1	2	3	4	5	6
3. This assessment proved effective in identifying the child's problems	1	2	3	4	5	6
4. I would suggest the use of this assessment to other teachers	1	2	3	4	5	6
5. I would be willing to receive assessment results such as those described with a student transferring into my school	1	2	3	4	5	6
6. The assessment would be appropriate for a variety of children	1	2	3	4	5	6
7. The assessment was a fair way to identify the child's problems	1	2	3	4	5	6
8. This assessment was reasonable for the problems described	1	2	3	4	5	6
9. I liked the assessment procedures used in this assessment	1	2	3	4	5	6
10. This assessment was a good way to handle the child's problems	1	2	3	4	5	6
11. Overall, this assessment was beneficial for the child	1	2	3	4	5	6
12. This assessment was helpful in the development of intervention strategies	1	2	3	4	5	6

Adapted from Eckert, Hintze, & Shapiro, 1999

APPENDIX C

THE INTERVENTION RATING PROFILE (IRP-15)

The purpose of this questionnaire is to obtain information that will aid in the evaluation of the intervention for _____. Please circle the number which best describes your agreement or disagreement with each statement.

		Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
		1	2	3	4	5	6
1.	This was an acceptable procedure for the child's problem behavior.	1	2	3	4	5	6
2.	Most teachers would find this procedure appropriate for problem behaviors.	1	2	3	4	5	6
3.	This procedure was effective in changing the child's problem behavior.	1	2	3	4	5	6
4.	I would suggest the use of this procedure to other teachers.	1	2	3	4	5	6
5.	The child's problem behavior was severe enough to warrant use of this procedure.	1	2	3	4	5	6
6.	Most teachers would find this procedure suitable for dealing with the child's problem behaviors.	1	2	3	4	5	6
7.	I would be willing to use this procedure again.	1	2	3	4	5	6
8.	This procedure did NOT result in any negative side-effects for the child.	1	2	3	4	5	6

		Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
		1	2	3	4	5	6
9.	This procedure would be appropriate for a variety of children.	1	2	3	4	5	6
10.	This procedure was consistent with those I have used in the past.	1	2	3	4	5	6
11.	This procedure was a fair way to deal with the child's problem behavior.	1	2	3	4	5	6
12.	This was reasonable for the child's problem behavior.	1	2	3	4	5	6
13.	I liked the procedure.	1	2	3	4	5	6
14.	This procedure was beneficial in understanding this child's problem behavior.	1	2	3	4	5	6
15.	Overall, this procedure was beneficial for the child.	1	2	3	4	5	6

Adapted from Martens, Witt, Elliott, & Darveaux, 1985.

APPENDIX D

FUNCTIONAL ANALYSIS PROTOCOL

Student Name: _____ Teacher: _____

Session: _____ Date: _____

Condition: **TANGIBLE**

Operational Definition and Measurement of Target Behaviors

Target Behavior:	To be determined based on referral
Definition:	To be determined based on referral
Dependent Measure:	Partial Interval Recording

Data Collection Procedures and Other Behavioral Definitions

1. Target Behavior = Determined Based on Referral

Session Duration:	10 min
Setting:	Classroom
Type of activity:	To be determined based on referral
Materials:	Student's preferred items/toys (Allow the student free access). Have all preferred items present.

Procedures:

1) Say, "[*Student's name*], would you like to play with this toy?"

2) Interact with the target student for 2 minutes or until he/she is engaged with the preferred item.

3) After the child has engaged with the preferred item, take the item away and place it in the child's view but out of her reach.

4) Seat student in designated area [*Teacher will present class activity that in the past has been related to the occurrence of the target behavior*].

5) Say "[*Student's Name*], it's time to do listen to Mrs. Holloway and join the group."

6) The teacher will then begin the group instruction procedure.

7) Contingent on occurrence of the target behavior:

    a. Present the child with the preferred item for a period of 30 seconds

8) Do not respond to any other problem behavior.

APPENDIX E

FUNCTIONAL ANALYSIS PROTOCOL

Student Name: _____ Teacher: _____

Session: _____ Date: _____

Condition: **CONTROL**

Operational Definition and Measurement of Target Behaviors

Target Behavior:	To be determined based on referral
Definition:	To be determined based on referral
Dependent Measure:	Partial Interval Recording

Data Collection Procedures and Other Behavioral Definitions

1. Target Behavior = Determined Based on Referral

Session Duration:	10 min
Setting:	Classroom
Type of activity:	To be determined based on referral
Materials:	Student's preferred materials/toys (Allow the student free access). Have all preferred items present.

Procedures:

1. Say, "[*Student's name*], would you like to play with these toys?"
2. Seat student in designated area
3. Interact with the student by providing a neutral comment every 30s or by responding to each appropriate response from the student.

4. Provide descriptive praise for appropriate toy play.

5. Provide any assistance necessary using a least-to-most prompt for appropriate toy play if requested or needed.

6. Do not respond to any problem behavior.

APPENDIX F

FUNCTIONAL ANALYSIS PROTOCOL

Student Name: _____ Teacher: _____

Session: _____ Date: _____

Condition: **ATTENTION**

Operational Definition and Measurement of Target Behaviors

Target Behavior:	To be determined based on referral
Definition:	To be determined based on referral
Dependent Measure:	Partial Interval Recording

Data Collection Procedures and Other Behavioral Definitions

1. Target Behavior = Determined Based on Referral

Session Duration:	10 min
Setting:	Classroom
Type of activity:	To be determined based on referral
Materials:	Task related items

Procedures:

1. Seat student in designated area [*Teacher will present class activity that in the past has been related to the occurrence of the target behavior*].

1. Say "[*Student's Name*], it's time to do listen to Mrs. Holloway and join the group."

2. Divert your attention from the student to your paper work.

5. Contingent on each occurrence of target behavior:
    - Provide a disapproving comment (or specific type of attention identified in the descriptive analysis)
    - Interact with the student for 30 seconds.
    - Then divert your attention again back to the work at your desk.

6. Do not respond to any other problem behavior.

APPENDIX G

FUNCTIONAL ANALYSIS PROTOCOL

Student Name: _____ Teacher: _____

Session: _____ Date: _____

Condition: **ESCAPE**

Operational Definition and Measurement of Target Behaviors

Target Behavior:	To be determined based on referral
Definition:	To be determined based on referral
Dependent Measure:	Partial Interval Recording

Data Collection Procedures and Other Behavioral Definitions

1. Target Behavior = Determined Based on Referral

Session Duration:	10 min
Setting:	Classroom
Type of activity:	To be determined based on referral
Materials:	Any Work Related Materials

Procedures:

1. Seat student in designated area [*Teacher will present class activity that in the past has been related to the occurrence of the target behavior*].

2. Say "[*Student's Name*], it's time to do listen to Mrs. Holloway and join the group."

3. Teacher will present student with instructions typical of the DI group activity.

4. Wait 5 s for independent initiation of activity
    - If student independently initiates task, experimenter will provide praise and deliver next command as needed.
    - If student does not initiate within 5 s, experimenter will use a verbal and gestural prompt (for example, say "*[student, answer the question.]"* while pointing to the teacher) and wait 5 s for initiation.
        - If student complies with the verbal/gestural prompt within 5 s, experimenter will provide praise and move to the next command as needed.
        - If the student does not comply within 5 s, experimenter will use physical guidance to have student comply (e.g., Say, "student, answer the question," while using gestural prompts to assist in handing you the pencil.)
            - DO NOT PRAISE STUDENT IF PHYSICAL GUIDANCE IS NEEDED.

5. Contingent on each occurrence of target behavior:
    - Remove work related materials and provide a 30s break.
    - Repeat the instruction after the 30s break.
    - DO NOT PROVIDE STUDENT WITH ANY ATTENTION.

6. Contingent on *compliance with a verbal or verbal and gestural prompt*:
    a. Provide descriptive praise
    b. REMEMBER: Do not provide praise if physical guidance was required.
    c. Point to the next problem and repeat instruction.

7. Do not respond to any other problem behavior.

APPENDIX H

DRA PROTOCOL

Student Name: _____ Teacher: _____

Session: _____ Date: _____

Protocol: **DRA**

Operational Definition and Measurement of Target Behaviors

Target Behavior:	To be determined based on referral
Definition:	To be determined based on referral
Dependent Measure:	To be determined based on referral
Replacement Behavior:	To be determined based on referral
Definition:	To be determined based on referral
Dependent Measure:	To be determined based on referral

Session Duration:	10 minutes
Setting:	Classroom
Type of activity:	To be determined based on referral
Materials:	Instruction Related Materials Identified Reinforcer (if applicable)

Procedures:

1. When the DRA component of the intervention begins, the teacher will engage in her scheduled instruction.

2. If the student of interest engages in the targeted inappropriate behavior, the teacher will withhold all previously identified forms of reinforcement.

3. If the student of interest engages in the identified appropriate replacement behavior, the teacher will then present that student with the identified form of reinforcement.
4. **Reinforcement will be withheld following the occurrence of any behavior accept the targeted appropriate replacement behavior.**

APPENDIX I

PRE-TEACHING PROTOCOL

Student Name: _____ Teacher: _____

Session: _____ Date: _____

Protocol: **Pre-Teaching**

Operational Definition and Measurement of Target Behaviors

Target Behavior:	To be determined based on referral
Definition:	To be determined based on referral
Dependent Measure:	To be determined based on referral
Replacement Behavior:	To be determined based on referral
Definition:	To be determined based on referral
Dependent Measure:	To be determined based on referral

Setting: Quiet area of the classroom

Materials: Pre-teaching narrative and Pre-teaching quiz

Procedures:

1. Escort the student to a quiet area of the classroom. [*Teacher will present narrative*].

2. Say "[*Student's Name*], *I am going to read this out loud to you (point to paper). This will tell you what is expected of you when we return to the classroom. I will also model these expectations for you.*"

3. Read the entire narrative to the child.
4. Following each description of the targeted inappropriate behavior and the appropriate replacement behavior in the narrative, model those behaviors for the student.

5. After reading the entire narrative to the child, say "[*Student's Name*], *do you understand what I have read to you?"*

- If student indicates that they do not understand what was read to them, repeat steps 2 through 4 until the student indicates that they understand what was read to them.

- When the student indicates that they understand what was read to them, continue to step 5

6. Present the student with the pre-teaching quiz

- If the student answers both questions correctly, continue to step 6.

- If the student answers any question incorrectly, wait 10 seconds, then repeat the question

- Continue to repeat the questions until the student provides the correct answer.

7. Tell the student to model the appropriate replacement behavior described in the narrative.

- If the student correctly models the appropriate replacement behavior, continue to step 8.

- If the student does not correctly model the appropriate replacement behavior, model the behavior for the student, then continue to step 6.

8. Inform the student that the described session will begin upon re-entry into the classroom.

9. Escort the student back to the group and begin group instruction.

APPENDIX J

PRE-TEACHING QUIZ

QUESTION #1

- What should you not do when we return to the classroom?

ANSWER #1

- Any answer that indicates an understanding of the targeted inappropriate behavior (To be determined based on referral).

QUESTION #2

- Instead of doing that, what should you do when we return to the classroom?

ANSWER #2

- Any answer that indicates an understanding of the targeted appropriate behavior (To be determined based on referral).

APPENIX K

PROCEDURAL INTEGRITY FOR FUNCTIONAL ANALYSIS CONDITIONS

Student: _____ Session: _____

Teacher: _____ Date: _____

Observer: _____ Condition: **TANGIBLE**

This form is used to assess the level of procedural integrity for each implemented functional analysis **tangible** condition. Record if the researcher behaviors were implemented as planned (*Yes*) or not implemented as planned (*No*) during each FA control condition.

	YES	**NO**	**N/A**
1. Participant is seated in designated area	____	____	____
2. Researcher has restricted student access to preferred items available in the classroom	____	____	____
3. Researcher presents the student with identified activity	____	____	____
4. Contingent on problem behavior, researcher presents Student with preferred item for 30s	____	____	____
4. Researcher does not respond to other problem behavior	____	____	____
5. Researcher does not present academic demands to the student	____	____	____
• **Repeated steps 3-5 for each 30 s interval**	____	____	____

APPENDIX L

PROCEDURAL INTEGRITY FOR FUNCTIONAL ANALYSIS CONDITIONS

Student: _____ Session: _____

Teacher: _____ Date: _____

Observer: _____ Condition: **CONTROL**

This form is used to assess the level of procedural integrity for each implemented functional analysis **control** condition. Record if the researcher behaviors were implemented as planned (*Yes*) or not implemented as planned (*No*) during each FA control condition.

	YES	**NO**	**N/A**
1. Participant is within designated area of target activity	____	____	____
2. Researcher provided student with access to preferred materials available in the classroom	____	____	____
3. Researcher provides interactive play and attention every 30 s	____	____	____
4. Researcher does not respond to problem behavior	____	____	____
5. Researcher does not present academic demands to the student	____	____	____
*** Repeated steps 3-5 for each 30 s interval**	**____**	**____**	**____**

APPENDIX M

PROCEDURAL INTEGRITY FOR FUNCTIONAL ANALYSIS CONDITIONS

Student: _____ Session: _____

Teacher: _____ Date: _____

Observer: _____ Condition: **ATTENTION**

This form is used to assess the level of procedural integrity for implemented functional analysis **attention** condition. Record if the researcher behaviors were implemented as planned (*Yes*) or not implemented as planned (*No*) during each FA attention condition.

	YES	NO	N/A
1. Participant is within designated area of target activity	____	____	____
2. Teacher presents task related items to child	____	____	____
4. Researcher interacts with the student until the student engages in the task	____	____	____
5. Researcher says, "I have to do my work now, it's time for DI."	____	____	____
6. Researcher diverts attention to the his/her work materials	____	____	____
7. Contingent on student exhibiting target behavior			
a. Researcher provides a disapproving comment	____	____	____
b. Interacts with the student for 30 seconds	____	____	____
c. Following 30 seconds of interaction, researcher diverts his/her attention back to the work materials	____	____	____
8. Teacher does not respond to any other problem behavior	____	____	____
*** Repeated steps 7-8 for each occurrence of target behavior**	**____**	**____**	**____**

APPENDIX N

PROCEDURAL INTEGRITY FOR FUNCTIONAL ANALYSIS CONDITIONS

Student: _____ Session: _____

Teacher: _____ Date: _____

Observer: _____ Condition: **ESCAPE**

This form is used to assess the level of procedural integrity for each implemented functional analysis **escape** condition. Record if the researcher behaviors were implemented as planned (*Yes*) or not implemented as planned (*No*) during each FA demand condition.

	YES	NO	N/A
1. Participant is within designated area of target activity	____	____	____
2. Researcher presents student with identified task demand	____	____	____
3. Researcher provides verbal instructions to student to complete the identified task	____	___	____
4. Researcher waits 5 s for compliance	____	____	____
a. The student complies	____	____	____
i. Researcher provides descriptive praise	____	____	____
ii. Researcher moves to the next demand	____	____	____
b. The student does not comply with 5 s	____	____	____
i. Researcher restates the instructions with verbal and gestural prompts	____	____	____
ii. Researcher waits 5 s for compliance	____	____	____
A. Student complies			
1. Researcher provides descriptive praise	____	____	____
2. Researcher moves to the next demand	____	____	____

B. Student does not comply ____ ____ ____

1. Researcher restates the instructions and provides hand-over-hand guidance ____ ____ ____

5. Researcher does not respond to any other problem behavior ____ ____ ____

6. When student exhibits problem behavior

a. Researcher removes task demand for 30 s ____ ____ ____

b. After 30 s, Researcher represents the task demand ____ ____ ____

*** Repeat steps 3-6 for each demand sequence** **____ ____ ____**

APPENDIX O

PROCEDURAL INTEGRITY FOR PRE-TEACHING IMPLEMENTATION

Student: _____ Session: _____

Teacher: _____ Date: _____

Observer: _____ Protocol: **Pre-Teaching**

This form is used to assess the level of procedural integrity for each implemented **pre-teaching** component of the PT+DRA intervention. Record if the teacher behaviors were implemented as planned (*Yes*) or not implemented as planned (*No*) during each group instruction session.

	YES	**NO**	**N/A**
1. Student was brought to quiet area of the classroom	____	____	____
2. Teacher indicated they will read a narrative to the student that will explain what will be expected of them in the classroom	____	____	____
3. Teacher read the entire narrative to the student	____	____	____
4. After reading the narrative, the teacher asked the student if he Understood what was read to them	____	____	____
5. If the student indicated that they did not understand the narrative, the teacher then read the narrative again	____	____	____
6. The pre-teaching quiz was presented to the student	____	____	____
7. Student answered both quiz questions correctly, or was Re-administered the questions until he responded correctly	____	____	____
8. Teacher informed the student that the expectations described In the narrative would be in effect upon the start of DI.	____	____	____

APPENDIX P

PROCEDURAL INTEGRITY FOR DRA IMPLEMENTATION

Student: _____ Session: _____

Teacher: _____ Date: _____

Observer: _____ Protocol: **DRA**

This form is used to assess the level of procedural integrity for each implemented **DRA component** of the PT+DRA intervention. Record if the teacher behaviors were implemented as planned (*Yes*) or not implemented as planned (*No*) during each group instruction session.

	YES	**NO**	**N/A**
1. Following the occurrence of the targeted inappropriate behavior, reinforcement was withheld	____	____	____
2. Following a 30 second absence of the targeted inappropriate behavior and at least one occurrence of the identified appropriate replacement behavior, reinforcement was provided	____	____	____
3. The identified form of reinforcement was withheld following following any other behaviors.	____	____	____

APPENDIX Q

HUMAN SUBJECTS REVIEW COMMITTEE APPROVAL

THE UNIVERSITY OF SOUTHERN MISSISSIPPI

Institutional Review Board

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HUMAN SUBJECTS PROTECTION REVIEW COMMITTEE
NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Human Subjects Protection Review Committee in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months. Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: **29101207**
PROJECT TITLE: **Differential Reinforcement of Alternative Behavior in Preschool Settings: Evaluation of a Pre-Teaching Component**
PROPOSED PROJECT DATES: **10/01/09 to 10/01/11**
PROJECT TYPE: **Dissertation or Thesis**
PRINCIPAL INVESTIGATORS: **Matthew William LeGray**
COLLEGE/DIVISION: **College of Education & Psychology**
DEPARTMENT: **Psychology**
FUNDING AGENCY: **N/A**
HSPRC COMMITTEE ACTION: **Expedited Review Approval**
PERIOD OF APPROVAL: **10/19/09 to 10/18/10**

Lawrence A. Hosman
Lawrence A. Hosman, Ph.D.
HSPRC Chair

10-21-09
Date

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